

بسم الله الرحمن الرحيم



www.asec.ir

Jane's

All the World's Aircraft 2007-2008

Editor-in-Chief: Paul Jackson FRAeS
Deputy Editor: Kenneth Munson AMRAeS
Assistant Editor: Lindsay Peacock

Ninety-eighth year of issue

Bookmark jawa.janes.com today!

The title is also available on online/CD-rom (New Gen), JDS (Jane's Data Services), EIS (Electronic Information Service), and Intel centres. Online gives the capability of real-time editing, permitting frequent updating. We trust our readers will use these facilities to keep abreast of the latest changes as and when they occur.

Updates online: Any update to the content of this product will appear online as it occurs.

Jane's All the World's Aircraft online site gives you details of the additional information that is unique to online subscribers and the many benefits of upgrading to an online subscription. Don't delay, visit jawa.janes.com today and view the list of the latest updates to this online service.

ISBN-10 0 7106 2792 0
ISBN-13 978 0 7106 2792 6

Copyright © 2007 by Jane's Information Group Limited, Sentinel House, 163 Brighton Road, Coulsdon, Surrey, CR5 2YH, UK

In the US and its dependencies
Jane's Information Group Inc, 110 N. Royal Street, Suite 200, Alexandria, Virginia 22314, US

Copyright enquiries
e-mail: copyright@janes.com

All rights reserved. No part of this publication may be reproduced, stored in retrieval systems or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without the prior written permission of the Publishers. Licences, particularly for use of the data in databases or local area networks are available on application to the Publishers.

Infringements of any of the above rights will be liable to prosecution under UK or US civil or criminal law.
Whilst every care has been taken in the compilation of this publication to ensure its accuracy at the time of going to press, the Publishers cannot be held responsible for any errors or omissions or any loss arising therefrom.

Printed in Great Britain by Cambridge University Press

Contents

This Edition has been compiled by:

Susan Bushell	AIRCRAFT: LIGHT AVIATION
Bill Gunston, OBE, FRAeS	GLOSSARY; AERO-ENGINES TABLES
Paul Jackson, FRAeS	AIRCRAFT: FRANCE (part) INTERNATIONAL (part), RUSSIAN FEDERATION (part), UKRAINE, UNITED KINGDOM (part) and UZBEKISTAN
Mike Jerram	AIRCRAFT: GENERAL AVIATION
Kenneth Munson, AMRAeS, ARHistS	AIRCRAFT: CIVIL AND MILITARY (part), LIGHTER THAN AIR
Lindsay Peacock	AIRCRAFT: INTERNATIONAL (military) and UNITED STATES OF AMERICA (military)

How to use <i>Jane's All the World's Aircraft</i>	[5]
Executive Overview	[11]
Notes and Acknowledgements	[14]
Aircraft Type Classifications	[15]
User's Charter	[21]
First Flights	[22]
Aerospace Calendar	[25]
Official Records	[29]
International aircraft registration prefixes	[32]
Glossary	[35]

Aircraft	
Argentina	1
Australia	2
Austria	16
Belgium	24
Brazil	27
Bulgaria	43
Canada	44
Chile	96
China	96
Colombia	132
Czech Republic	134
Finland	165
France	165
Georgia	207
Germany	208
Hungary	241
India	243
Indonesia	256
International	256
Iran	347
Israel	355

CONTENTS

Italy	356
Japan	391
Jordan	403
Kazakhstan	406
Korea, South	407
Lithuania	413
Malaysia	414
Netherlands	415
New Zealand	417
Pakistan	421
Poland	423
Romania	439
Russian Federation	443
Serbia	536
Slovakia	538
Slovenia	540
South Africa	542
Spain	547
Sweden	553
Switzerland	557
Taiwan	571
Turkey	571
Ukraine	572
United Kingdom	588
United States	607
Uzbekistan	931
Vietnam	932
 Air-Launched Missiles	 933
 Aero-Engines	 937
 Propellers	 947
 Indexes	 951

Jane's All the World's Aircraft website: jawa.janes.com

How to use: Jane's All the World's Aircraft

Content

Described on the following pages are all known powered aircraft, of which details have been received, currently in, or anticipating, commercial production in all countries of the World, apart from those built at home, entirely from plans; and rapidly dismantled, ultralight recreational machines. Exceptions to these criteria are made in the cases of 'one-off' aircraft of technical interest—for example, those undertaking pioneering work or designed as a practical exercise by aeronautical universities.

Many other of the World's aircraft remaining in service will be found in *Jane's Aircraft Upgrades* which contains full descriptions of military and commercial aircraft, both fixed- and rotary-wing, that are no longer in production or are coming to the end of their production cycles, but are still in commercial and/or military service worldwide. *Jane's Aircraft Upgrades* also includes subsequent upgrade programmes for featured types that maintain operational effectiveness. Some types that remain only in small-scale recreational use are not included—this embraces classic jets, as they are no longer in operational service.

Structure

Preliminary to the main section are the foreword, or Executive Overview and six compilations of—it is hoped—useful information:

Aircraft Type Classifications – Listing of the entire aircraft type description contents according to their role or function, thereby facilitating easy comparison of different makes of aircraft offered to fulfil the same role.

First Flights – Historical record of maiden flights during the immediately previous calendar year.

Aerospace Calendar – Historical record of significant aviation events during the immediately previous calendar year and concerning aircraft featured in this book.

Official Records – Current holders of the more significant aviation World records.

International Aircraft Registration Prefixes – Cross reference of international civil aircraft registration allocations.

Glossary – Explanation of aeronautical terms used in this book.

Entries in the main, **Aircraft** section are in alphabetical order (a) by country (including International) and then (b) by manufacturer's name. In the cases of manufacturers producing a diversity of aircraft, those of obvious military potential are presented first. However, it should be noted that a few of the larger constructors are divided into operating divisions, within which individual aircraft types are arranged. In the case of the multinational EADS, aircraft descriptions are in the French, Polish and Spanish sections.

Record Structure

Company entries begin with a brief introduction, including postal address, telephone/fax numbers, e-mail and website addresses and the names of some significant executives. The last-mentioned listing is by no means exhaustive and further details will be found in *Jane's International ABC Aerospace Directory* and *Jane's International Defence Directory*. Subcontractors and suppliers to the aerospace industry appear in *Jane's Aircraft Component Manufacturers*, which also provides rapid references to the subcontractors involved in certain prominent aircraft programmes.

Aircraft entries are subdivided under the following headings:

Type – A brief description of the aircraft's function. A full list of categories appears under the heading Type Classifications.

Programme – A record of key events in an aircraft's production history. In the case of significant aircraft, which may have a long and detailed development phase, a short summary lists the key dates in that phase in an easily retrievable format.

Current Versions – Where applicable, details of available models (marks) and cross-reference to earlier versions now out of production.

Customers – Present total on order and produced, often in tabular form, for military aircraft and those civil types for which such a list would not be of prohibitive length.

Costs – Price per unit or programme price, plus any other disclosed information on R&D expenditure.

Design Features – Where appropriate, opens with a broad statement of design objectives and the means by which they were achieved. This is followed by details such as aerofoil section and helicopter rotor speeds.

Flying Controls – Here is described the method of controlling the aircraft, it being assumed that the reader has a basic understanding of the function of ailerons, flaps, rudders, trim tabs and the other conventional manoeuvring surfaces (refer to 'conventional and manual' in the Glossary). Descriptions are concerned with the method by which the controls are operated (manual/powered) and appropriate control inputs determined (autopilot/fly-by-wire, for example).

Structure – Configuration, materials and any special manufacturing methods; details of subcontractors or partners producing significant elements of the airframe.

Landing Gear – Includes tyre sizes and pressures for wheeled aircraft, as well as ground turning circle. Braking parachutes, where fitted.

Power Plant – Number and power of engines; helicopter transmission ratings; fuel capacity. Brief additional details are provided in the Aero-Engines listing; fuller descriptions of turbine power plants are in *Jane's Aero-Engines*.

Accommodation – Seating arrangements, access, environmental control and, for transport aircraft, cargo loading capacity; type of ejection seat, if fitted.

Systems – Power generation provisions, de-/anti-icing equipment, pressurisation/air conditioning and similar equipment.

Avionics – The entry is subdivided into communications, radar, flight aids, instruments, mission equipment (mostly military or law-enforcement) and self-defence (military).

Equipment – Cargo-handling aids, spraying/firefighting apparatus, lighting, ballistic recovery parachutes and similar items.

Armament – Fixed and air-dropped/launched weapons listed by the manufacturer as actual or potential armament. Not all items may have been cleared for carriage and not all operators will use those which have. Refer also to the Missiles listing, where appropriate.

Dimensions, External – Includes door sizes and certain ground clearances.

Dimensions, Internal – Includes areas and volumes where relevant.

Areas – Wings, fixed tail surfaces and control surfaces.

Weights and Loadings – As supplied by the manufacturer; individual aircraft may vary.

Performance – Observations as above; all speeds assumed T AS unless stated otherwise.

Operational Noise Levels – Internationally recognised measurements of landing and take-off sound at airports.

Measurements of all types are given in both SI (metric) and Imperial units, the more common conversion factors for which are in the Glossary. Performance details are quoted in good faith and certain critical conversions 'rounded' to give a margin of safety, although *Jane's* does not purport to be an alternative to the manufacturer's operating notes.

In addition to the main section on aeroplanes, helicopters and lighter than air craft are others detailing Air-Launched Missiles, Aero-Engines and Propellers:

Air-Launched Missiles – A rapid reference which seeks not to duplicate the separate and vastly more detailed *Jane's Air-Launched Weapons*, indicating instead how the potential of aircraft described is augmented by the weapons they carry.

Aero-Engines – Arranged in alphabetical order of manufacturer, irrespective of their country of origin, within the classifications of piston, turboprop, turboshaft and jet engine.

Propellers – This lists some of the main airscrew manufacturers and provides explanations of their designation systems.

Images

Photographs are provided for each aircraft, and general arrangement ('three-view') drawings for most. Images are annotated with a seven digit number which uniquely identifies them in *Jane's* image database.

Other Information

Any update to the content of this product will appear online as it occurs (see jawa.janes.com for the additional benefits of an online subscription to *Jane's All the World's Aircraft* and for details of our free online trial) and will be incorporated annually into future print editions.

For copyright enquiries contact: copyright@janes.com

DISCLAIMER This publication is based on research, knowledge and understanding, and to the best of the author's ability the material is current and valid. While the authors, editors, publishers and Jane's Information Group have made reasonable effort to ensure the accuracy of the information contained herein, they cannot be held responsible for any errors found in this publication. The authors, editors, publishers and Jane's Information Group do not bear any responsibility or liability for the information contained herein or for any uses to which it may be put.

This publication is provided for informational purposes only. Users may not use the information contained in this publication for any unlawful purpose. Without limiting the generality of the foregoing, users must comply with all applicable laws, rules and regulations with regard to the transmission of facsimiles.

While reasonable care has been taken in the compilation and editing of this publication, it should be recognised that the contents are for information purposes only and do not constitute any guidance to the use of the equipment described herein. Jane's Information Group cannot accept any responsibility for any accident, injury, loss or damage arising from the use of this information.

EDITORIAL AND ADMINISTRATION

Chief Content Officer: Ian Kay, e-mail: ian.kay@janes.com

Group Publishing Director: Sean Howe, e-mail: sean.howe@janes.com

Publisher: Sara Morgan, e-mail: sara.morgan@janes.com

Compiler/Editor: Welcomes information and comments from users who should send material to: Information Collection; Jane's Information Group, Sentinel House, 163 Brighton Road, Coulsdon, Surrey CR5 2YH, UK; Tel: (+44 20) 87 00 37 00; Fax: (+44 20) 87 00 39 00; e-mail: yearbook@janes.com

SALES OFFICES

Europe and Africa

Jane's Information Group, Sentinel House, 163 Brighton Road, Coulsdon, Surrey CR5 2YH, UK
Tel: (+44 20) 87 00 37 50 Fax: (+44 20) 87 00 37 51
e-mail: customer.servicesuk@janes.com

North/Central/South America

Jane's Information Group, 110 N Royal Street, Suite 200, Alexandria, Virginia 22314, US
Tel: (+1 703) 683 21 34 Fax: (+1 703) 836 02 97
Tel: (+1 800) 824 07 68 Fax: (+1 800) 836 02 97
e-mail: customer.servicesus@janes.com

Asia

Jane's Information Group, 78 Shenton Way, #10-02, Singapore 079120, Singapore
Tel: (+65) 63 25 08 66 Fax: (+65) 62 26 11 85
e-mail: asiapacific@janes.com

Oceania

Jane's Information Group, PO Box 3502, Rozelle Delivery Centre, New South Wales 2039 Australia
Tel: (+61 2) 85 87 79 00 Fax: (+61 2) 85 87 79 01
e-mail: oceania@janes.com

Middle East

Jane's Information Group, PO Box 502138, Dubai, United Arab Emirates
Tel: (+971 4) 390 23 36 Fax: (+971 4) 390 88 48
e-mail: mideast@janes.com

Japan

Jane's Information Group, Palaceside Building, 5F, 1-1-1, Hitotsubashi, Chiyoda-ku, Tokyo 100-0003, Japan
Tel: (+81 3) 52 18 76 82 Fax: (+81 3) 52 22 12 80
e-mail: japan@janes.com

ADVERTISEMENT SALES OFFICES

(Head Office)

Jane's Information Group

Sentinel House, 163 Brighton Road, Coulsdon, Surrey CR5 2YH, UK
Tel: (+44 20) 87 00 37 00 Fax: (+44 20) 87 00 38 59/37 44
e-mail: defadsales@janes.com

Janine Boxall, Global Advertising Sales Director,
Tel: (+44 20) 87 00 38 52 Fax: (+44 20) 87 00 38 59/37 44
e-mail: janine.boxall@janes.com

Richard West, Senior Key Accounts Manager
Tel: (+44 1892) 72 55 80 Fax: (+44 1892) 72 55 81
e-mail: richard.west@janes.com

Nicky Eakins, Advertising Sales Manager
Tel: (+44 20) 87 00 38 53 Fax: (+44 20) 87 00 38 59/37 44
e-mail: nicky.eakins@janes.com

Carly Litchfield, Advertising Sales Executive
Tel: (+44 20) 87 00 39 63 Fax: (+44 20) 87 00 37 44
e-mail: carly.litchfield@janes.com

(US/Canada office)

Jane's Information Group

110 N Royal Street, Suite 200, Alexandria, Virginia 22314, US
Tel: (+1 703) 683 37 00 Fax: (+1 703) 836 55 37
e-mail: defadsales@janes.com

US and Canada

Robert Silverstein, US Advertising Sales Director
Tel: (+1 703) 236 24 10 Fax: (+1 703) 836 55 37
e-mail: robert.silverstein@janes.com

Sean Fitzgerald, Southeast Region Advertising Sales Manager
Tel: (+1 703) 836 24 46 Fax: (+1 703) 836 55 37
e-mail: sean.fitzgerald@janes.com

Linda Hewish, Northeast Region Advertising Sales Manager
Tel: (+1 703) 836 24 13 Fax: (+1 703) 836 55 37
e-mail: linda.hewish@janes.com

Janet Murphy, Central Region Advertising Sales Manager
Tel: (+1 703) 836 31 39 Fax: (+1 703) 836 55 37
e-mail: janet.murphy@janes.com

Richard L Ayer

127 Avenida del Mar, Suite 2A, San Clemente, California 92672, US
Tel: (+1 949) 366 84 55 Fax: (+1 949) 366 92 89
e-mail: ayercomm@earthlink.com

Rest of the World

Australia: *Richard West* (UK Head Office)

Benelux: *Nicky Eakins* (UK Head Office)

Eastern Europe (excl. Poland): MCW Media & Consulting Wehrstedt
Dr Uwe H Wehrstedt
Hagenbreite 9, D-06463 Ermsleben, Germany
Tel: (+49 03) 47 43/620 90 Fax: (+49 03) 47 43/620 91
e-mail: info@Wehrstedt.org

France: Patrice Février
BP 418, 35 avenue MacMahon, F-75824 Paris Cedex 17, France
Tel: (+33 1) 45 72 33 11 Fax: (+33 1) 45 72 17 95
e-mail: patrice.fevrier@wanadoo.fr

Germany and Austria: *MCW Media & Consulting Wehrstedt* (see Eastern Europe)

Greece: *Nicky Eakins* (UK Head Office)

Hong Kong: *Carly Litchfield* (UK Head Office)

India: *Carly Litchfield* (UK Head Office)

Iran: Ali Jahangard
Tel: (+98 21) 88 73 59 23
e-mail: ali.jahangard@eidehinfo.com

Israel: *Oreet International Media*
15 Kinneret Street, IL-51201 Bene Berak, Israel
Tel: (+972 3) 570 65 27 Fax: (+972 3) 570 65 27
e-mail: admin@oreet-marcom.com
Defence: Liat Heiblum
e-mail: liat_h@oreet-marcom.com

Italy and Switzerland: *Ediconsult Internazionale Srl*
Piazza Fontane Marose 3, I-16123 Genoa, Italy
Tel: (+39 010) 58 36 84 Fax: (+39 010) 56 65 78
e-mail: genova@ediconsult.com

Japan: *Carly Litchfield* (UK Head Office)

Middle East: *Carly Litchfield* (UK Head Office)

Pakistan: *Carly Litchfield* (UK Head Office)

Poland: *Carly Litchfield* (UK Head Office)

Russia: Anatoly Tomashevich
1/3, appt 108, Zhivopisnaya Str, Moscow, 123103, Russia
Tel/Fax: (+7 495) 942 04 65
e-mail: to-anatoly@tochka.ru

Scandinavia: *Falsten Partnership*
23, Walsingham Road, Hove, East Sussex BN41 2XA, UK
Tel: (+44 1273) 77 10 20 Fax: (+44 1273) 77 00 70
e-mail: sales@falsten.com

Singapore: *Richard West* (UK Head Office)

South Africa: *Richard West* (UK Head Office)

South Korea: Kim TaeHae
HARNTER
#213 Ventures Incubating Center, Korea Aviation University
200-1 HwaJeon, GoYang City, GyoungGi-Do, 412 791 Korea
Tel: (+82 (0)) 167 14 11 13
e-mail: taehae_kim@hotmail.com

Spain: Macarena Fernandez
VIA Exclusivas S.L., Virato, 69 - Sotano C, E-28010, Madrid, Spain
(+34 91) 448 76 22 Fax: (+34 91) 446 02 14
e-mail: macarena@viaexclusivas.com

Turkey: *Richard West* (UK Head Office)

ADVERTISING COPY

Kate Gibbs (UK Head Office)
Tel: (+44 20) 87 00 37 42 Fax: (+44 20) 87 00 38 59/37 44
e-mail: kate.gibbs@janes.com

For North America, South America and Caribbean only:
Tel: (+1 703) 683 37 00 Fax: (+1 703) 836 55 37
e-mail: us.ads@janes.com

Jane's Defence Equipment Library

Aero-Engines
Air-Launched Weapons
Aircraft Upgrades
All the World's Aircraft
Ammunition Handbook
Armour and Artillery
Armour and Artillery Upgrades
Avionics
C4I Systems
Electro-Optic Systems
Explosive Ordnance Disposal
Fighting Ships
Infantry Weapons
Land-Based Air Defence
Military Communications
Military Vehicles and Logistics
Mines and Mine Clearance
Naval Weapon Systems
Nuclear, Biological and Chemical Defence
Radar and Electronic Warfare Systems
Strategic Weapon Systems
Underwater Warfare Systems
Unmanned Aerial Vehicles and Targets

Jane's Defence Magazines Library

Defence Industry
Defence Weekly
Foreign Report
Intelligence Digest
Intelligence Review
International Defence Review
Islamic Affairs Analyst
Missiles and Rockets
Navy International
Terrorism and Security Monitor

Jane's Market Intelligence Library

Aircraft Component Manufacturers
All the World's Aircraft
Defence Industry
Defence Weekly
Electronic Mission Aircraft
Fighting Ships
Helicopter Markets and Systems
International ABC Aerospace Directory
International Defence Directory
Marine Propulsion
Naval Construction and Retrofit Markets
Police and Homeland Security Equipment
Simulation and Training Systems
Space Systems and Industry
Underwater Security Systems and Technology
World Armies
World Defence Industry

Jane's Security Library

Amphibious and Special Forces
Chemical-Biological Defense Guidebook
Facility Security
Fighting Ships
Intelligence Digest
Intelligence Review
Intelligence Watch Report
Islamic Affairs Analyst
Police and Homeland Security Equipment
Police Review
Terrorism and Security Monitor
Terrorism Watch Report
World Air Forces
World Armies
World Insurgency and Terrorism

Jane's Sentinel Library

Central Africa
Central America and the Caribbean
Central Europe and the Baltic States
China and Northeast Asia
Eastern Mediterranean
North Africa
North America
Oceania
Russia and the CIS
South America
South Asia
Southeast Asia
Southern Africa
The Balkans
The Gulf States
West Africa
Western Europe

Jane's Transport Library

Aero-Engines
Air Traffic Control
Aircraft Component Manufacturers
Aircraft Upgrades
Airport Review
Airports and Handling Agents –
 Central and Latin America (inc. the Caribbean)
 Europe
 Far East, Asia and Australasia
 Middle East and Africa
 United States and Canada
Airports, Equipment and Services
All the World's Aircraft
Avionics
High-Speed Marine Transportation
Marine Propulsion
Merchant Ships
Naval Construction and Retrofit Markets
Simulation and Training Systems
Transport Finance
Urban Transport Systems
World Airlines
World Railways

Jane's

Intelligence and Insight You Can Trust

FREE ENTRY/CONTENT IN THIS PUBLICATION

Having your products and services represented in our titles means that they are being seen by the professionals who matter - both by those involved in the procurement and by those working for the companies that are likely to affect your business. We therefore feel that it is very much in the interest of your organisation, as well as Jane's, to ensure your data is current and accurate.

- **Don't forget** - You may be missing out on business if your entry in a Jane's product is incorrect because you have not supplied the latest information to us.
- **Ask yourself** - Can you afford not to be represented in Jane's printed and electronic products? And if you are listed, can you afford for your information to be out of date?
- **And most importantly** - The best part of all is that your entries in Jane's products are **TOTALLY FREE OF CHARGE**.

Please provide (using a photocopy of this form) the information on the following categories where appropriate:

1. Organisation name: _____
2. Division name: _____
3. Location address: _____

4. Mailing address if different: _____

5. Telephone (please include switchboard and main departmental contact numbers, for example Public Relations, Sales, and so on): _____

6. Facsimile: _____
7. E-mail: _____
8. Web sites: _____
9. Contact name and job title: _____

10. A brief description of your organisation's activities, products and services: _____

11. Jane's publications in which you would like to be included: _____

Please send this information to:

Jacqui Beard, Information Collection, Jane's Information Group
Sentinel House, 163 Brighton Road, Coulsdon, Surrey CR5 2YH, UK
Tel: (+44 20) 87 00 38 08
Fax: (+44 20) 87 00 39 59
e-mail: yearbook@janes.com

Copyright enquiries:

e-mail: copyright@janes.com

Please tick this box if you do not wish your organisation's staff to be included in Jane's mailing lists ☐

JAWA

WWW.ASEC.ir



Climbing vertically over the Palm Jumeirah, Dubai, this Saab JAS 39C Gripen was caught in an impressive pose by the camera of Katsuhiko Tokunaga, one of the World's most accomplished aviation photographers

1164942

Executive Overview: Aircraft

Like aerospace's Tweedledum and Tweedledee, Airbus and Boeing grow more alike as they proclaim their differences with increasing stridency. The see-saw of their annual and self-inflicted "orders and deliveries battle" continued its fickle gyrations during 2006, but with some added and most unwelcome jerks.

As recently as 2003 and 2004 this yearly *Jane's* essay discussed Boeing's woes in the forms of its blind alley pursuit of a transonic airliner and belated turn to the sounder venture of what is now the 787 Dreamliner; and its first ever double trouncing by Airbus in both annual order and delivery totals. Airbus, meanwhile was working on design of its forthcoming A350 challenger to Boeing and raising the stakes with construction of several prototypes of the mighty A380.

By 2006, the US company was building up the largest-ever pre-launch order book for an airliner and had claimed back the annual orders crown after six years; while, contrariwise, at Airbus, prospective customers' dissatisfaction with the A350 project forced it to be re-launched as the A350XWB; and actual customers vented their anger at mounting delivery delays with the A380.

Having been hailed upon its coalescence into a single company as a triumph for European integration, Airbus continued to reflect the political realities of the EU in February 2007 when CEO Louis Gallois attempted overdue restructuring, with the attendant economies, closures and loss of 10,000 jobs.

Seen as essential to increase efficiency, reduce costs and offset the effects of the weak US dollar, the restructuring plan (Power8) floundered at the first hurdle and had to be postponed because Airbus' national shareholders were paralysed by the vision of redundancies in their own countries and the consequent political backlash. The matter rapidly reached presidential level, with political commentators suggesting neither French nor German leader would be willing to compromise: the former with elections due in two months' time and the latter believing Germany was being disproportionately affected.

Eventually, on 28 February 2007, reality gained the upper hand, but with the redundancies spread over a four-year period. The advisability of that leisurely contraction was immediately brought into question by Gallois, who observed, "We should have done this many years ago [when] Boeing was in difficulties; the dollar was strong; and we were selling aeroplanes like bread." Former Airbus CEO Jean Pierson remarked before the job cuts, "The system we now have cannot last. EADS as a company is heading to the wall."

The EADS/Airbus strategy appears to be one in which it matches Boeing's Dreamliner manufacturing plan, whereby some 90 per cent of the aircraft's key items are designed and built by outside firms. The UK is also keen to participate in this process, despite the fact that BAE Systems disposed of its 20 per cent Airbus share in 2006. Divestment was to schedule, which resulted in it coming immediately after the share price plummet that accompanied the mid-year, management-related *contretemps*. A traditional supplier of Airbus wings, the UK division of the company, which will lose 1,600 jobs in the current reorganisation, is investing in composites technology and looking to bring in experienced partners to align itself with the parent firm's plans for diversification of development and supply.

More time was lost to Boeing during the course of 2006 when, having announced the A350XWB re-vamp at Farnborough in July, Airbus was distracted until December in making the launch announcement. That fact may not be entirely unconnected with Boeing's 70 per cent share of the widebody market that year, its 787 Dreamliner having had an almost clear run while the XWB remained in limbo.

Boeing has made full use of computer technology in its marketing endeavours, employing a popular, modern means of projecting a positive image of itself: the 'blog'. "Randy's Journal" has the framework of the informal 'web log' so popular with Internet habitués, and while steering clear of the more headline-grabbing blogs kept by some of society's less inhibited members, it combines in successful measure solid and useful facts about the airliner business with a steady drip of anti-Airbus contributions from both the blogger and his many correspondents.

While honestly labelled as a Boeing site, Randy's Journal evokes

echoes of the *Gustav Siegfried Eins* radio station of the Second World War, which sowed despondency in German ranks through a carefully woven fabric of news, uncomfortable truth, criticism of inefficiency, and innuendo. Randy's more ambitious target would appear to be both Germany and France. That such web-based journals will be launched by more aerospace companies would seem to be certain—in the same way that the immediacy and intensity of discomfort when settling one's person upon a temporarily misplaced carpet tack is certain.

In assessing the tactical victories of airliner order, delivery and backlog numbers, sight may be lost of the strategic view. The bald figures for the past six years are in the adjacent table (No. 1).

TABLE 1: AIRBUS and BOEING ORDERS and DELIVERIES

YEAR	AIRBUS			BOEING		
	Orders	Deliveries	Backlog	Orders	Deliveries	Backlog
2001	274	325	1,679	335	525	1,610
2002	233	303	1,575	619	424	1,357
2003	254	305	1,454	631	463	1,110
2004	366	320	1,500	272	285	1,097
2005	1,035	378	2,177	1,002	290	1,809
2006	790	434	2,533	1,047	398	2,455
TOTALS	2,952	2,065		3,906	2,385	

In view of the importance of backlog in determining a company's stock value, it is instructive to make a medium-check on the strength of these notes of promise. Between 2001 and 2006, Airbus took 2,952 orders which remained good at the end of their calendar year of placement, and delivered 2,065 airliners. Added to the opening backlog of 1,679, the positive difference of 887 between orders and deliveries would give a backlog at the beginning of 2007 of 2,566, whereas it is 2,533. In other words, 33 orders, some 1 per cent of those placed, have 'evaporated'.

Boeing tells a different story: 3,906 orders, 2,385 deliveries, an apparent increase of 1,521 in backlog, which should thus total 3,131. In fact, it is 2,455, showing an evaporation of 676 orders—17 per cent.

If these two major manufacturers take no more orders and suffer similar backlog evaporation until their last aircraft is built, Airbus will have delivered 4,573 aircraft since the dawn of the 21st Century and Boeing, a slightly lower 4,423. An unlikely, but interesting situation, mitigated by the fact that Boeing will have sold more higher-value airliners than its rival.

A more detailed breakdown of 2006 performance appears in Tables 2 and 3. These may be said also to summarise the World situation, save the trickle of airliners from Russia in the form of the traditional one or two Ilyushin Il-96s and a veritable flurry of Tupolev Tu-204s and 214s sufficient to warrant the first use for over a decade of the fingers of one's second hand to tally them.

Sukhoi continues with its plans to improve the Russian share of regional airliner manufacture, its RRJ gaining the hardly imaginative epithet, Superjet 100 (or SSJ) during 2006. Embraer's latest family was completed at the same time, when its largest member, the 195, entered service. Bombardier, meanwhile, waited until early in 2007 to announce a go-ahead for its challenge to the Embraer 190 with a further stretch of the CRJ family, known as the 1000. Still marking time, the Bombardier CSeries underwent further design refinements in 2006 and has been reconfirmed recently as still standing in the (theatrical) wings, if not in immediate prospect of taking to (aerodynamic) wings.

Now that the successors to Dornier have delivered the last Model 328, it is left to Bombardier and Embraer to define the regional jet market. Production continues its decline, although with the Brazilian company the clear market leader. Notable is the fact that the larger-capacity regionals are making a better showing than their smaller siblings, confirming the wisdom of Embraer's timing of its E series launch and giving hope to Bombardier's CRJ1000. The CSeries finds itself in the right size bracket of a shrinking market, facing an extremely tricky go/no-go decision—as might the shipyard building tea clippers at the same time that the maritime steam turbine caught on.

TABLE 2: AIRBUS ORDERS AND DELIVERIES
(at 1 January 2007)

	Orders Total	Deliveries Total	Orders in 2006	Deliveries in 2006	Backlog
A300	561	555	0	9	6
A310	260	255	0	0	5
Total 300-310	821	810	0	9	11
A318	90	36	minus 7	8	54
A319	1,497	930	258	137	567
A320	2,700	1,633	272	164	1,067
A321	649	371	130	30	278
Total 318-321	4,936	2,970	653	339	1,966
A330-200	395	243	74	39	152
A330-300	279	204	29	23	75
A340-200/300	246	241	2	2	5
A340-500	31	25	5	4	6
A340-600	121	71	5	18	50
Total 330-340	1,072	784	115	86	288
A350-800	71	0	4	0	71
A350-900	31	0	11	0	31
Total 350	102	0	15	0	102
A380	156	0	24	0	156
A380F	10	0	minus 17	0	10
Total 380	166	0	7	0	166
Total	7,097	4,564	790	434	2,533

TABLE 3: BOEING COMMERCIAL AIRPLANE GROUP ORDERS AND DELIVERIES
(at 1 January 2007)

	Orders Total	Deliveries Total	Orders in 2006	Deliveries in 2006	Backlog
707/720	1,010	1,010	0	0	0
Total 707/720	1,010	1,010	0	0	0
717-200	155	155	0	5	0
Total 717	155	155	0	5	0
727	1,831	1,831	0	0	0
Total 727	1,831	1,831	0	0	0
737-100	30	30	0	0	
737-200	1,114	1,114	0	0	
737-300	1,113	1,113	0	0	
737-400	486	486	0	0	
737-500	389	389	0	0	
737-600	69	69	-6	10	
737-700/C-40A	1,265	806	193	107	459
737-700BBJ	99	85	9	10	14
737-700C	12	11	1	1	2
737-800	2,082	1,100	461	172	982
737-800BBJ	15	13	2	2	2
737-900	52	52	-3	0	0
737-900BBJ	3	0	3	0	3
737-900ER	99	0	69	0	99
Total 737	6,828	5,268	729	302	1,560
747-100/SP	250	250	0	0	
747-200/E-4	393	393	0	0	
747-300	81	81	0	0	
747-400	446	442	0	0	4
747-400D	19	19	0	0	
747-400ER	6	6	0	0	
747-400ERF	40	20	8	6	20
747-400F	126	108	4	8	18
747-400M	61	61	0	0	24
747-8	24	0	24	0	24
747-8F	54	0	36	0	54
Total 747	1,500	1,380	72	14	120
757-200	913	913	0	2	
757-200M	1	1	0	0	
757-200PF	80	80	0	0	
757-300	55	55	0	0	
Total 757	1,049	1,049	0	2	0
767-200	128	128	0	0	0
767-200ER	121	118	0	2	3
767-300	104	104	0	0	0
767-300ER	534	514	10	7	20
767-300F	50	46	0	3	4
767-400ER	38	37	0	0	1
Total 767	975	947	10	12	28

	Orders Total	Deliveries Total	Orders in 2006	Deliveries in 2006	Backlog
777-200	88	87	0	0	1
777-200ER	426	386	0	23	40
777-200LR	36	2	6	2	34
777-300	60	60	0	1	0
777-300ER	237	69	37	39	168
777F	56	0	33	0	56
Total 777	903	604	76	65	299
767-3	43	0	0	0	43
787-8	330	0	99	0	330
787-9	75	0	61	0	75
Total 787	448	0	160	0	448
Grand Totals	14,699	12,244	1,047	398	2,455

Table does not include one each of 727-100, 747-100, 757-200, 767-200 and 777-200 owned by Boeing. Annual order total is net (after deduction of cancellations). Order total for Boeing 787 at 31 December 2005 was retrospectively reduced from 291 to 288, modifying 2006 data accordingly.

TABLE 4: REGIONAL JET ORDERS AND DELIVERIES

	Net Orders 2006	Deliveries 2006	Deliveries 2005	Deliveries 2004
Bombardier				
CRJ100/200	minus 16	1	35	75
CRJ440	nil	nil	12	33
CRJ700	minus 33	13	49	52
CRJ705	nil	nil	15	nil
CRJ900	98	50	14	15
Embraer				
ERJ-135	minus 15	nil	2	1
ERJ-140	minus 20	nil	nil	nil
ERJ-145	55	12	46	87
E 170	minus 41	32	46	46
E 175	77	11	14	nil
E 190	126	40	12	nil
E 195	17	3	nil	nil
Totals	248	162	245	309

At mid-year 2006, figures were even poorer, with both Bombardier and Embraer showing overall negative figures for orders. In contrast, regional turboprops have continued their revival, so much so that ATR has predicted an increase in its manufacturing rate to 44 in 2007 and 60 in 2008, returning its Toulouse factory to the prosperous days of the early 1990s. Only it and Bombardier remain active in the West, suggesting they are well placed to profit from a turning of the tide against regional jets. China's MA60 have had little success outside Africa and neighbouring Asian countries, while the Antonov An-140 has yet to make an impact on the market, despite its three production lines.

TABLE 5: REGIONAL TURBOPROP ORDERS AND DELIVERIES

	Net Orders 2006	Deliveries 2006	Deliveries 2005	Deliveries 2004
ATR 42	7	8	5	5
ATR 72	56	16	10	8
Dash 8Q-100/200	3	3	1	1
Dash 8Q-300	11	16	9	8
Dash 8Q-400	24	31	18	10
Totals	101	74	43	32

Established business jet manufacturers continue their cautious development of the market, while newcomers take a more radical—and more risky—approach. Hawker, which is now being transferred (with Beechcraft) from Raytheon to an independent, purpose-formed company, used the 2006 NBAA Convention to launch two derivatives of what some may remember as the 1962 de Havilland DH.125 Jet Dragon, while the same event saw Cessna launch the CJ4 and that treble superlative, but really only minor 'tweak', the Citation XLS+.

Spectrum, a 2005 launch with the SA-33, returned with the larger SA-40, despite having lost the prototype of the former in an accident a few months before. Grob's G.180 SPⁿ second prototype was a further sad loss of 2006, while Honda used the AirVenture show at Oshkosh in July to proclaim its intention of marketing the HondaJet, having in the past declared it to be only a technology testbed. Piaggio also entered the confessional and admitted paternity of the twin-jet concept which was touring the bazaars in artist's impression form a year before, promising that it will now proceed to the hardware stage.

At the increasingly blurred point at which business jets merge into personal jets, Piper launched the single-engine PA-47 PiperJet; Excel-Jet flew and crashed the Sport-Jet; and AIR had the Epic Elite jet ready to fly until a new wing had to be designed and built in order to de-conflict with the intellectual rights of its erstwhile partner, Farnborough Aircraft. After some niggling problems not all of its own making, Eclipse scraped home on its target of a 2006 first customer delivery with the symbolic hand-over of the initial production Model 500 on 31 December.

TABLE 6: BUSINESS JET DELIVERIES

	2006	2005	2004	2003
Airbus A319ACJ	10	9	15	5
Beechcraft Premier	23	30	37	29
Boeing BBJ	13	4	3	7
Bombardier Learjet 40	26	21	17	0
Learjet 45/XR	30	28	22	17
Learjet 60	15	18	9	12
Challenger 300	55	50	28	1
Challenger 604	29	36	29	24
Global Express/XRS	22	13	20	14
Global 5000	18	17	4	0
Challenger 850/870/890	18			
Total	259	183	129	68
Cessna Mustang	1	0	0	0
CitationJet 1	0	14	20	22
CitationJet 1+	25	4	0	0
CitationJet 2	1	23	27	56
CitationJet 2+	36	0	0	0
CitationJet 3	72	48	6	0
Citation Bravo	18	21	25	31
Citation Encore	14	13	24	21
Citation Excel	0	0	23	48
Citation XLS	73	64	32	0
Sovereign	57	46	9	0
Citation X	12	14	15	18
Total	309	247	181	196
Dassault Falcon 50EX	5	5	5	8
Falcon 900C	0	1	3	3
Falcon 900DX	4	2	0	0
Falcon 900EX	16	16	15	20
Falcon 2000	6	6	11	12
Falcon 2000EX	30	21	29	16
Total	61	51	63	59
Eclipse 500	1	0	0	0
Embraer Legacy	27	20	13	13
Gulfstream 100/150/200	42	26	22	24
350-550	71	63	56	50
Total	113	89	78	74
Hawker 400XP	53	53	28	24
800XP/850XP	64	58	50	47
Total	117	111	78	71
Grand total	933	744	597	522

A remarkable increase of 80 per cent over four years is likely to be exceeded as more personal jets are delivered and new types reach maturity, the latter category including offerings from Adam and Diamond.

Utility and turboprop business aircraft show more modest growth, although that does not appear to have acted as a deterrent to hopeful manufacturers. Aerocomp, AIR, ATI, Evektor, Extra, GAP (Farnborough), Ibis and Quest have prospective entrants at various stages short of production, suggesting disappointment ahead for several hopefuls.

TABLE 7: LIGHT TURBOPROP DELIVERIES

	2006	2005	2004	2003
Adam 500	4	2	0	0
Beechcraft King Air 90	52	35	27	18
King Air 200	42	37	39	38
King Air 350	48	42	36	24
Cessna 208 Caravan	8	11	13	8
208B Caravan	59	75	51	49
Piaggio Avanti	19	14	16	12
Pilatus PC-12	90	80	70	61
Piper Meridian	49	40	26	24
Socata TBM 700/850	42	31	31	34
Total	413	367	309	268

Light aviation's breadth and depth precludes detailed analysis of the kind which can be applied to types dealt with above, so it must suffice to judge trends by reference to some of the larger producers. The American Light Sport classification continues to expand and draw in ever larger numbers of approved designs, of which many are from Europe. In the past year, Cessna has made moves to acquire some of this action for itself and the LSA prototype unveiled at Oshkosh in July 2006 could be its means to enter the medium reaches of the recreational market. Such a step may not appeal to its fellow companies, but 're-badgeing' may be a less involved alternative for them (if Cessna has not already adopted that route).

Having celebrated 50 years of its Model 172 and 182, Cessna chose 2006 to fly the prototype of a possible successor, provisionally known as the NGP (Next Generation Piston). If the likes of Columbia and Cirrus have not already done so, the plethora of little Light Sports arriving from Europe will have awakened Cessna to the potential of composites construction for cost reduction and for grace of line. Uniquely in Cessna, the NGP relies on composites to no mean degree, and while a sizeable proportion of American owner-pilots is likely to remain faithful to 'tin' aeroplanes for decades to come, it would be wise to put a few eggs in the composites basket.

TABLE 8: SELECTED FACTORY-BUILT LIGHTPLANE DELIVERIES

	2006	2005	2004	2003
American Champion				
Model 7	25	41	38	23
Model 8	35	48	56	40
Beechcraft Bonanza	80	71	62	55
Baron	38	28	31	27
Cessna 172	409	351	236	349
182	467	359	329	165
206	129	112	89	74
Columbia 300*	0	0	0	19
350*	39	25	28	32
400*	146	89	50	5
Cirrus SRV*	6	9	3	2
SR20*	150	116	91	112
SR22*	565	475	459	355
Diamond DA20*	55	54	58	75
DA40*	220	207	203	153
DA42*	163	68	0	0
Gippsland Airvan	20	22	20	19
Liberty XL2*	29	2	0	0
Maule (all)	38	27	27	32
Mooney Bravo	5	20	9	5
Ovation	63	65	28	30
Eagle	0	0	0	1
Acclaim	7	0	0	0
Piper Warrior	19	37	18	31
Archer	29	16	19	49
Arrow	5	9	12	16
Saratoga	47	45	40	37
6X/6XT	21	34	38	21
Seneca	26	12	10	28
Seminole	11	29	11	16
Malibu Mirage	31	11	15	7
Socata TB (all)	0	9	5	40
Symphony SA 160*	5	10	0	0
Tiger AG-5B	3	15	19	18
Totals	2,886	2,416	2,004	1,836

* Composites construction

Changes of note during the past year have included launch of Mooney's Acclaim and cessation of manufacture by both Symphony and Tiger.

Meaningful analysis of the helicopter market has been complicated of late by the reluctance of Sikorsky and AgustaWestland to publish order and delivery figures on a calendar year basis. Bell's 2006 results remain elusive because of a long term problem affecting the company's entire website and defeating any attempts to initiate an e-mail dialogue. Only Eurocopter appears to have the will and means to produce a timely summary of its activities, which shows that deliveries in 2006 totalled 381.

For many years to come, the world of military aviation will refer to December 2006 as a time-marker for two events of strategic importance. In the West, Lockheed Martin flew the prototype F-35 Lightning II Joint Strike Fighter (JSF) and in the East, Russia's Air Forces (VVS) received the first two Sukhoi Su-34 interdictors from series production. The first event is significant for not only the USAF, Navy and Marines, but for the several nations expected to acquire the machine and operate it as the major—if not the sole—combat aircraft in their inventories until the 2040s.

'Fullback' is a name which will probably convey only an erroneous, sport-related message to most Western military personnel, which fact is a reflection of the diminished threat of conflict with a militarily weakened Russia since 1991. However dimly recalled, that is the reporting name assigned to Sukhoi's latest interdictor, the Su-34, which is earmarked to replace the Su-24 'Fencer'. After a long pause caused by financial instability, Russia is again receiving new military combat aircraft from what is planned to be a properly funded and productive assembly line. Even allied to a recent resurgence of political bullying from the Kremlin, several squadrons of 'Fullbacks'—a still distant prospect—will not signal a return to the Cold War, but the recent delivery does mark a turning point in the fortunes of the VVS which Western countries should note and monitor.

The present year will see the USAF tackle the thorny question of backing the Airbus A330 or Boeing KC-767 as its delayed next-generation tanker and have decided for it which turboprop twin (C-27J or C-295) should be the Joint Cargo Aircraft it will share with the US Army. In view of the importance of C3I on the modern battlefield, it is curious that the Northrop Grumman E-10 conversion of 767 is expected to expire in 2007 because of funding starvation.

In the realm of military helicopters, the US Army has also pursued off-the-shelf procurement of existing designs from around the world. In December 2006, the Eurocopter UH-72A Lakota was commissioned into service in satisfaction of a requirement announced in September 2004, for which the EC 145 was selected in June 2006. Also in December, the German Army became the first of several air arms to receive a NHIndustries NH90—20 years to the month after design began and 23 years from the initial draft specification.

Helicopters and tiltrotors now appear to be more in demand for the US forces than fixed-wing equipment, and while latest budgetary plans restrict procurement of the latter, they call for attrition replacement helicopters (Bell UH-1Ys and AH-1Zs, Sikorsky UH-60s and Boeing CH-47s) as well as extra purchases of Bell RAH-70s. In fact, in a significant reversal of recent trends RAH-70 requirements are increased by 154, from 358 to 512.

While it has never been determined with absolute accuracy just how many swallows do make a Summer, it is unlikely to be as few as 154. For the foreseeable future, therefore, Western military aircraft production is likely to remain a slow and only moderately rewarded business, seeking any icing for its cake from Iran's increasingly worried neighbours.

Notes and Acknowledgements

In very few of its almost 100 editions has *Jane's All the World's Aircraft* undergone such a fundamental revision as that presented in this volume. The compiling team of Susan Bushell, Mike Jerram, Kenneth Munson and Lindsay Peacock have again sorted, evaluated and incorporated a mass of sometimes conflicting information which seems to increase in size with each year.

A redesign of the book has presented the opportunity to modify, update and, to some extent, standardise drawings produced over the years by three different technical artists. We hope that the new style strikes the correct balance between utility and size in a publication which last year broke the 1,000-page 'barrier' for the first time.

Readers with large collections of *Jane's* may contest that assertion. The 1969-70 "bonus edition" was, indeed, 1,072 pages, but this encompassed 492 pages of UAVs, sailplanes, missiles in detail, rockets and space, aero engines in detail, aviation books, ground equipment, airports, aircraft equipment, airlines and avionics. However, none of these is covered in the current volume, most having grown into sizeable subject publications in their own right. Comparing like with like, *All the World's Aircraft* has doubled the number of its pages since 1969....but the CAP.10, SF-260, HS 125 (Hawker), H-47 Chinook, Cessna 172, Cessna 182, Champion Citabria, PC-6 Porter, C-130 Hercules, Piper PA-28, Sikorsky H-53, and several others in that edition, remain with us to this day.

The burgeoning size of our paper edition is due in no small part to the additional 46 companies and 102 aircraft added in the past year. Others—but by no means as many—have fallen by the sky's wayside, so that the final tally for this edition is 1,011 aircraft and 565 companies, not including 13 separate divisions of some of the major

manufacturers. With regard to the previously mentioned general arrangement drawings, 102 brand new ones have been added to this edition and 271 existing illustrations modified and updated. The total of new photographs is 1,175, in the main (aircraft) section of the book, plus a further 50 in the preliminaries.

In addition to the compiling team already mentioned, the editor is indebted to others for their work in this edition: James Goulding and Mike Badrocke for the line drawings; and to Bill Gunston for compilation of the Glossary and Aero Engines tables. At the *Jane's* offices, Tracy Johnson processed all this information—including the inevitable last-minute avalanche of urgent updates which was handled with impressive speed—ably assisted in the early stages by Carol Offer.

We also rely on the goodwill of many others who contribute to completeness of the book without thought of reward: Yefim Gordon, whose regular inputs enhance the Russian Federation entries; Robert Hewson, Jamie Hunter and Martin Streetly, considered together as fellow editors of *Jane's* publications, but also assisting over and above the call of duty; Rod Simpson, well-travelled editor of *Air Britain's Aviation World* and recorder of light and general aviation; and Gerard Frawley of *Australian Aviation*.

Thanks are also extended to Patrick Allen, Peter Cooper (Falcon Aviation), Kensuke Ebata, John Fricker, Jean-Louis Gaynecoetche and Mitsuhiro Kadota for the welcome contribution of illustrations and advice.

Paul Jackson

Pulham Market, Norfolk, March 2007

Editor's Biography

Paul Jackson FRAeS, Editor-in-Chief, *Jane's All the World's Aircraft*

The chance gift of an aircraft book at the age of six was the Genesis of a passion for all matters aeronautical that has absorbed Paul Jackson for almost half a century. Editor of an aviation society newsletter in his native East Yorkshire shortly after leaving school, he contributed to amateur and professional aviation journals, on both historical and current matters, for a further decade before becoming a freelance aerospace writer and editor. In 1987, he was invited to join the compiling team of *Jane's All the World's Aircraft*, being appointed its editor in 1994. Inevitably, his hobbies are aviation related, including flying and maintaining a veteran Aeronca Chief lightplane; chairing a branch of the Popular Flying Association; sitting as a committee member of an Air Training Corps squadron; and aviation photography.



Paul Jackson

0567909

Aircraft Type Classifications

To assist comparison between different makes of aircraft undertaking broadly similar roles, the 'TYPE' classifications which introduce each aircraft description are standardised and arranged into 13 classes.

Classification is according to *Jane's* own criteria; in some instances this may differ from a manufacturer's description. Exact capacities and engine types and numbers for large aircraft are omitted in these shorthand descriptions. However, as size diminishes, such aspects assume greater importance and, accordingly, are quoted.

Except where the type description immediately and obviously precludes it (for example, 'Strategic transport'), aircraft are assumed to be monoplanes powered by a single piston engine and propeller. Multiple engines, turboprop and jet propulsion are specifically mentioned. In deference to common usage, 'jet' includes turbojets and turbofans, as more properly described in the 'POWER PLANT' paragraph.

All aircraft are Class A (or equivalent) certified/certifiable and factory-assembled; where clarification is necessary, the term 'lightplane' is employed. Ultralights and/or aircraft built from kits are specifically noted as such. However, in view of widely differing national legislation on ultralights, it must be noted that the term has several interpretations; the most liberal (in terms of permissible maximum weight) is used in this book.

The more versatile makes of aircraft cannot be given justice in deliberately short type descriptions. Readers should be aware that the ability to undertake surveillance, geological survey, VIP transport, water bombing and many other duties can be easily bestowed on medium transports and some other types of aircraft. Crop sprayers can be reconfigured in moments for firefighting and oil pollution dispersal. The full story will be found under the 'CURRENT VERSIONS' heading.

As an aid to analysis, totals for each category are given in parentheses.

Five years have passed since this annual summary first appeared, so it is now possible to discern with a measure of certainty the trends in the aerospace industry's perceived needs for different classes of aircraft.

Bomber and surveillance	+9%
Fighter and trainer	-22%
Miscellaneous and government	+71%
Transport	-28%
Airliner	+10%
Business	+60%
Utility	+22%
Amphibian	+100%
Lightplanes (factory built)	+11%
Utility kitbuilt	+24%
Kitplanes and Ultralights	+58%
Rotary wing	+7%
Lighter than air	-16%

Trends noted above refer to the number of designs currently offered in each category; for example 23 bomber and surveillance aircraft on the market in 2002, but 25 today. Most noticeable is the falling number of military aeroplanes such as fighter/trainer and transport, to which may be added a 26 per cent decline in the number of overtly military helicopters on the market. The civil field, by contrast, continues its expansion, with business jets and their closely related cousins, the light personal jets, in the ascendant. Single-engine, piston-powered machines, particularly for home assembly, are noticeably strong performers, while the rotary wing total increase reflects the fact that civil expansion has outstripped military contraction.

Of those 1,042 specific types of aircraft on the market, 63 per cent of 851 aeroplanes have a single piston engine for power; as do 46 per cent of 158 rotary-wing aircraft. Of contents as a whole, 10 per cent of aeroplanes and 17 per cent of helicopters were designed for military purposes, not counting several types of helicopters which are equally suitable for either purpose.

Class 1: Bomber and surveillance (25)



Boeing 737 AEW&C 1121673

These are military or paramilitary aircraft of widely differing size and performance.

Strategic bomber (2)

- XAC H-6 (China)
- Tupolev Tu-160 (Russian Federation)

Maritime reconnaissance four-jet (2)

- BAE Systems Nimrod MRA. Mk 4 (United Kingdom)
- Kawasaki MP-X (Japan)

Maritime surveillance twin-jet (1)

- Boeing P-8A (United States)

Maritime surveillance twin-turboprop (3)

- Airtech CN-235 MP Persuader and CN-235 MPA (International)
- ATR 42 Surveyor (International)
- CASA C-212 Patrullero (Spain)

Airborne early-warning and control system (3)

- Airbus AEW&C (International)
- Boeing 737 AEW&C (United States)
- Northrop Grumman E-2C Hawkeye (United States)

Airborne ground surveillance system (3)

- Airbus A321 AGS (International)
- Boeing 767 Military Versions (United States)
- Raytheon Sentinel (United States)

Airborne multisensor command and control system (1)

- Northrop Grumman E-10 (United States)

Multisensor surveillance twin-turboprop (1)

- BNG BN2T-4S Defender 4000 (United Kingdom)

Multisensor surveillance turboprop (1)

- Pilatus PC-12M and Spectre (Switzerland)

Multisensor surveillance twin-prop (1)

- Vulcanair P.68 Observer and P.68 Diesel (Italy)

Multisensor surveillance lightplane (7)

- ALMS Calao (France)
- BLA Dragonfly (Optica) (United Kingdom)
- Diamond HK36TTC-MPX (Austria)
- German Aircraft Sky-MAXX (Germany)
- Schweizer SA 2-37 (United States)
- Schweizer SA 2-38 (United States)
- Seabird Jordan SB7L-360 Seeker (Jordan)

Class 2: Fighter and trainer (61)



Saab JAS 39A Gripen 1047037

Air superiority fighter (3)

- SAC (Sukhoi Su-27) J-11 (China)
- Sukhoi Su-27 (Russian Federation)
- Sukhoi Su-30 (Su-27PU) (Russian Federation)

Multirole fighter (18)

- ADA Tejas (LCA) (India)
- Boeing F-15E Eagle (United States)
- Boeing F/A-18E/F Super Hornet (United States)
- CAC J-7 (China)
- CAC J-10 (China)
- Dassault Mirage 2000 (France)

- Dassault Rafale (France)
- Eurofighter Typhoon (International)
- Lockheed Martin F-16 Fighting Falcon (United States)
- Lockheed Martin (645) F-22 Raptor (United States)
- Lockheed Martin F-35 Joint Strike Fighter (United States)
- MiG-29 and MiG-35 (Russian Federation)
- Saab JAS 39 Gripen (Sweden)
- SAC J-8 (China)
- Sukhoi Su-30M (Russian Federation)
- Sukhoi Su-33UB (Su-27KUB) (Russian Federation)
- Sukhoi Su-35 and Su-37 (Su-27SM2) (Russian Federation)
- Sukhoi I-21 PAKFA (Russian Federation)

Attack fighter (8)

- Alenia/Aermacchi/Embraer AMX (International)
- CAC FC-1 Xiaolong (China)
- HAL (SEPECAT) Jaguar International (India)
- IRIAF (HESA) Azarakhsh (Iran)
- IRIAF Saeghe (Iran)
- Mitsubishi F-2 (Japan)
- Sukhoi Su-34 (Russian Federation)
- XAC JH-7 (China)

Light fighter/advanced jet trainer (1)

- Aero L 159 (Czech Republic)

Advanced jet trainer (3)

- Boeing/BAE Systems T-45 Goshawk (International)
- GAIC FTC-2000 and CY-1 (China)
- HAIC Q-5J (China)

Advanced jet trainer/light attack jet (9)

- Aermacchi M-346 (Italy)
- Avioane IAR-99 Soim (Romania)
- BAE Systems Hawk 50, 60 and 100 Series (United Kingdom)
- HAIC L-15 (China)
- HAL HTT-39 (India)
- IACI (SAHA) Shafagh (Iran)
- KAI T-50 and A-50 Golden Eagle (Korea, South)
- MiG-AT (Russian Federation)
- Yakovlev Yak-130 (Russian Federation)

Basic jet trainer (2)

- IRIAF Tazarve (Iran)
- MMZL Bielik and Fenix (Poland)

Basic jet trainer/light attack jet (5)

- Aermacchi MB-339 (Italy)
- Aermacchi M-311 (Italy)
- HAL HJT-36 Sitara (India)
- LMAASA AT-63 Pampa (Argentina)
- HAIC JL-8 (China)

Basic turboprop trainer/attack lightplane (2)

- Embraer EMB-314 Super Tucano (Brazil)
- Golden/US Aircraft A-67 Dragon (United States)

Basic turboprop trainer (7)

- Beechcraft (3000) T-6A Texan II (United States)
- Fuji T-7 (Japan)
- IAMI (HESA) HT-80 (Iran)
- KAI KT-1 Woong-Bee (Korea, South)
- Pilatus PC-7 Mk IIM Turbo Trainer (Switzerland)
- Pilatus PC-9M Advanced Turbo Trainer (Switzerland)
- Pilatus PC-21 (Switzerland)

Basic prop trainer/attack lightplane (1)

- Aermacchi SF-260 (Italy)

Basic prop trainer (2)

- ENAER (ECH-51) T-35 Pillan (Chile)
- HAIC CJ-6A (China)

Class 3: Miscellaneous and/or government (12)



Boeing AL-1A 1121775

Aircraft of diverse or multiple duties employed generally, but not exclusively, by the state.

Missile defence system (1)

- Boeing AL-1A (United States)

Multirole twin-jet (1)

KAC Hawker 800 (Japan)

High-altitude platform (2)

Grob HALE G 600 and 600 ER (Germany)

Scaled 318 White Knight (United States)

Technology demonstrator (7)

AMV 211 (United States)

FanWing Ultralight (United Kingdom)

Northrop Grumman OFW (United States)

Piccard Solar Impulse (Switzerland)

Scaled 311 Capricorn (United States)

Scaled 316 SpaceShipOne (United States)

Terrafugia Transition (United States)

Ornithopter (1)

UTIAS 'Big Flapper' (Canada)

Class 4: Transport (26)



Sukhoi Su-80 1133356

Generally of a military nature, often with rear loading ramps. The larger aircraft are usually, but not exclusively, jet-powered. Light transports are those not exceeding 5,670 kg (12,500 lb).

Tanker-transport (2)

Airbus MultiRole Tanker-Transport (MRTT) (International)

Boeing 767 Military Versions (United States)

Medium transport/multirole (8)

Airbus A400M (International)

Antonov An-70 (Ukraine)

Boeing C-17A Globemaster III (United States)

Ilyushin/Irkut/HAL IRTA-21 (International)

Kawasaki C-X (Japan)

Lockheed Martin 382U/V Hercules (United States)

SAC Y-8 (China)

SAC Y-9 (China)

Twin-turboprop transport (11)

Airtech CN-235 (International)

Alenia C-27J Spartan (Italy)

Antonov An-38 (Ukraine)

CASA C-212 Series 400 (Spain)

CASA C-295 (Spain)

CSIR Saras (India)

HAL (Dornier) 228 (India)

Ilyushin Il-112 (Russian Federation)

PZL M28 Skytruck (Poland)

PZL M28B Bryza (Poland)

Sukhoi Su-80 (Russian Federation)

Twin-turboprop light transport (5)

AII AVA-606 (Iran)

Dorna 12/19-seat transport (Iran)

HAI Y-12 (China)

Skydesign SB100 Skylander (France)

Viking DHC-6 Twin Otter (Canada)

Class 5: Airliner and freighter (56)



Embraer ERJ-135 1153715

Civilian passenger and cargo aircraft. Jet power is implied for all large airliners; number of engines given only for medium-size aircraft; regional jets are all twins.

Supersonic airliner (1)

EADS/JAXA NEXST-1 (International)

High-capacity airliner (1)

Airbus A380 (International)

Wide-bodied airliner (9)

Airbus A300-600 (International)

Airbus A330 (International)

Airbus A340 (International)

Airbus A350 (International)

Boeing 747 (United States)

Boeing 767 (United States)

Boeing 777 (United States)

Boeing 787 Dreamliner (United States)

Ilyushin Il-96-300 (Russian Federation)

New concept airliner (1)

Blended Wing Body (International)

Four-jet freighter (1)

Boeing 747-400F (United States)

Twin-jet airliner (9)

Airbus A318 (International)

Airbus A319 (International)

Airbus A320 (International)

Airbus A321 (International)

Boeing 717 (United States)

Boeing 737 (United States)

Bombardier CSeries (Canada)

Tupolev Tu-204 and Tu-214 (Russian Federation)

Tupolev Tu-334 (Russian Federation)

Twin-jet freighter (6)

Airbus A300-600 Convertible and A300-600

Freighter (International)

Antonov An-72 and An-74 (Ukraine)

Antonov An-74-300 and An-174 (Ukraine)

Boeing 767-300 General Market Freighter (United

States)

Tupolev Tu-330 (Russian Federation)

XAC WJ (China)

Regional jet airliner (17)

ACAC ARJ21 (China)

Antonov An-128 (Ukraine)

Antonov An-148 (Ukraine)

Bombardier CRJ200 and Challenger 800 (Canada)

Bombardier CRJ700 Srs 701 (Canada)

Bombardier CRJ700 Srs 705 (Canada)

Bombardier CRJ900 (Canada)

Embraer ERJ-145 (Brazil)

Embraer ERJ-135 (Brazil)

Embraer ERJ-140 (Brazil)

Embraer 170 and 190 (Brazil)

JADC YSX (Japan)

Kawasaki YPX (Japan)

Mitsubishi NGRJ (Japan)

Sukhoi RRJ (Russian Federation)

Tupolev Tu-324 and Tu-414 (Russian Federation)

Yakovlev MS-21 (Russian Federation)

Twin-turboprop airliner (10)

Antonov An-128 (Ukraine)

Antonov An-140 (Ukraine)

ATR 42 (International)

ATR 72 (International)

Bombardier Dash 8 Q100 and Q200 (Canada)

Bombardier Dash 8 Q300 (Canada)

Bombardier Dash 8 Q400 (Canada)

IAMI (HESA) Ir.An-140 Faraz (Iran)

Ilyushin Il-114 (Russian Federation)

XAC MA60 (China)

Twin-turboprop freighter (1)

UAI FF-1080 Freight Feeder (United States)

Class 6: Business (83)



Dassault Falcon 7X 1151481

The established configuration of a business jet being a twin, only single- and tri-jet configurations are specifically noted. Detailed strata devised by participants in the business jet market are not reproduced here. Instead, the main category is subdivided into small business jets with accommodation for six or fewer passengers; long-range (sub-airliner size) business jets with the 4,000 n mile (7,400 km; 4,600 mile) range necessary to fly from the US eastern seaboard to Western Europe; and the central core of twin-jets with upwards of seven seats.

Supersonic business jet (4)

Aerion SBJ (United States)

Gulfstream SBJ (United States)

SAI QSBJ (United States)

Tupolev Tu-444 (Russian Federation)

Long-range business jet (5)

Bombardier BD-700 Global Express (Canada)

Bombardier Global 5000 (Canada)

Gulfstream G300 and G400 (United States)

Gulfstream G350 and G450 (United States)

Gulfstream G500 and G550 (United States)

Large business jet (3)

Boeing Business Jet (BBJ) (United States)

Boeing Business Jet 2 (BBJ 2) (United States)

Boeing Business Jet 3 (BBJ 3) (United States)

Long-range business tri-jet (2)

Dassault Falcon 900 (France)

Dassault Falcon 7X (France)

Business tri-jet (1)

Dassault Falcon 50 (France)

Business jet (28)

Bombardier BD-100 Challenger 300 (Canada)

Bombardier CL-600 Challenger (Canada)

Cessna Citation CJ4 (United States)

Cessna 550 Citation Bravo (United States)

Cessna 560 Citation Encore (United States)

Cessna 560XL Citation Excel and XLS (United

States)

Cessna 560XLS+ Citation XLS Plus (United States)

Cessna 680 Citation Sovereign (United States)

Cessna 750 Citation X (United States)

Cessna LCC (United States)

Dassault Falcon 2000 (France)

Embraer EMB-135BJ Legacy 600 (Brazil)

Embraer Phenom 300 (Brazil)

Eviation EV-20 Vantage (United States)

Hawker 400 (United States)

Hawker 800 (United States)

Hawker 900XP and 750 (United States)

Hawker 4000 (United States)

Grob G 180 SP[®] Utility Jet (Germany)

Gulfstream G100 (United States)

Gulfstream G150 (United States)

Gulfstream G200 (United States)

Learjet 40 (United States)

Learjet 45 (United States)

Learjet 60 (United States)

Piaggio P.1XX (Italy)

Spectrum S-33 Independence (United States)

Spectrum S-40 Freedom (United States)

Light business jet (12)

Adam A700 AdamJet (United States)

Beechcraft Premier (United States)

Cessna 510 Citation Mustang (United States)

Cessna 525 Citation CJ1 and CJ1+ (United States)

Cessna 525A Citation CJ2 and CJ2+ (United

States)

Cessna 525B Citation CJ3 (United States)

Digantara/Aeronimbus NMX (International)

Eclipse Eclipse 500 (United States)

Embraer Phenom 100 (Brazil)

Honda HA-420 HondaJet (United States)

Millennium Foxjet II (United States)

Sino Swearingen SJ30-2 (United States)

Private jet (9)

AIR Epic Elite (United States)

Cirrus Jet (United States)

Diamond D-Jet (Austria)

Excel-Jet Sport-Jet (United States)

Maverick Leader (United States)

Maverick Leader II (United States)

Maverick Cruiser Jet (United States)

Maverick SmartJet (United States)

Piper PiperJet (United States)

Two-seat jet sportplane (2)

ATG-1 Javelin (United States)

Messerschmitt Me 262 (United States)

Business mono-jet kitbuilt (1)

Aerocomp CA-J Comp Air Jet (United States)

Business twin-turboprop (2)

Beechcraft King Air 90 (United States)

Piaggio P.180 Avanti (Italy)

Business turboprop (9)

AIR Epic LT and Dynasty (United States)

Extra EA-500 (Germany)

GAP Kestrel JP100 (International)

Grob G 140TP (Germany)

Grob G 160 Ranger (Germany)

Piper PA-46-500TP Malibu Meridian (United

States)

SAIC LE-800 (China)

Socata TBM 700 (France)

Socata TBM 850 (France)

Business twin-prop (3)

Adam A500 CarbonAero (United States)

ATI RT-700 (United States)

High Performance TT62 Baltic (Germany)

Business prop (2)

Extra EA-400 (Germany)

Piper PA-46-350P Malibu Mirage (United States)

Class 7: Utility (79)



Neiva Ipanema 1121629

Restricted to single- and twin-engine passenger or passenger/light freight aircraft with accommodation, typically, for four or six persons. An intermediate category bridging commercial and private ownership. Crop sprayers are included.

Utility turboprop twin (5)

- Beechcraft King Air 200 (United States)
- Beechcraft King Air 350 (United States)
- BNG BN2T Turbine Islander and Defender (United Kingdom)
- Evektor EV-55 Outback (Czech Republic)
- Reims F406 Caravan II (France)

Light utility twin-prop transport (7)

- Avia Accord-201 (Russian Federation)
- BNG BN2B Islander (United Kingdom)
- MiG-201 (Russian Federation)
- Tupolev Tu-44 (Russian Federation)
- VulcanAir P.68, Observer and P.68 Diesel (Italy)
- VulcanAir VA 300 (Italy)
- Wolfsberg Raven 257 (Czech Republic)

Six-seat utility twin (2)

- Beechcraft Baron 58 (United States)
- Piper PA-34-220T Seneca V (United States)

Five-seat utility twin (1)

- OMA Sud Skycar (Italy)

Four-seat utility twin (5)

- Aeropract-37 (Russian Federation)
- Diamond DA42 Twin Star (Austria)
- Piper PA-44-180 Seminole (United States)
- MMZL EM-11 Orka (Poland)
- Tecnam P2006T (Italy)

Light utility turboprop (20)

- Aeroprogress/ROKS-Aero T-101 Grach (Russian Federation)
- Aerotech (Intracom) SMG-92T Turbo Finist (Switzerland)
- Cessna 208 Caravan (United States)
- Comp Air 9 (United States)
- Ibis Ae 270 Spirit (International)
- Integrity Integrity (Australia)
- Intracom GM-17 Viper (Switzerland)
- Intracom DS-12 (Switzerland)
- Integrity Integrity (Australia)
- Khrunichev T-501 (Russian Federation)
- Khrunichev T-205 and T-207 (Russian Federation)
- Laplan L-551 (Russian Federation)
- Maule M-7 (United States)
- Myasishchev M-101T Sokol (Russian Federation)
- PAC 750XL (New Zealand)
- Pilatus PC-12 (Switzerland)
- Quest Kodiak (United States)
- Smolensk (Technoavia) SM-92T Turbo Finist (Russian Federation)
- Smolensk (Technoavia) SM-2000 (Russian Federation)
- VulcanAir VF 600W Mission (Italy)

Light utility transport (6)

- Gippsland GA-8 Airvan (Australia)
- Laplan L-451 (Russian Federation)
- Maule M-7 and M-9 (United States)
- Pilatus PC-6 Turbo Porter (Switzerland)
- RAA Voyager E-7 (Russian Federation)
- Sherpa Sherpa (United States)

Utility biplane (1)

- SAMC Y-5 (China)

Six-seat utility transport (6)

- Beechcraft Bonanza 36 (United States)
- Cessna 206 Stationair and T206 Turbo Stationair (United States)
- Piper PA-32R-301 Saratoga II HP (United States)
- Piper PA-32R-301FT 6X (United States)
- Piper PA-32R-301T Saratoga II TC (United States)
- Piper PA-32R-301XTC 6XT (United States)

Five-seat utility transport (1)

- Found FBA-2C Bush Hawk (Canada)

Agricultural sprayer twin (1)

- VSTOL SST 2000 Paradigm (United States)

Agricultural sprayer (23)

- All AVA-303 (Iran)
- Air Tractor AT-401 Air Tractor (United States)
- Air Tractor AT-402 Turbo Air Tractor (United States)
- Air Tractor AT-502 Turbo (United States)
- Air Tractor AT-602 (United States)
- Air Tractor AT-802 (United States)
- Avantazh A-31 Spectrum (Russian Federation)
- CZAW (Zenair) CH 701-AG STOL (Czech Republic)
- Gippsland GA200 Fatman (Australia)
- HAIC N-5 (China)
- IPE-010 (Brazil)
- Ikar Ai-70 (Ukraine)
- Istra Ezhik (Russian Federation)
- Khrunichev T-419 Strekoza (Russian Federation)
- Kulon-2 SKhS (Russian Federation)
- MVEN Fermer (Russian Federation)
- NEIVA EMB-202 Ipanema (Brazil)
- PAC Cresco (New Zealand)
- PZL M18 Dromader (Poland)
- Sukhoi Su-38L (Russian Federation)
- Thrush Turbo-Thrush S2R (United States)
- Thrush 660 Turbo-Thrush (United States)
- Weatherly 620 (United States)

Agricultural sprayer ultralight (1)

- Aerolites Aeromaster (United States)

Class 8: Amphibian (36)



Beriev Be-103 Bekas 1042996

All such aircraft (including the occasional flying boat) are included here for ease of reference, even those assembled from kits or classified as ultralights.

Four-turboprop amphibian (1)

- ShinMaywa US-1A and US-2 (Japan)

Twin-turboprop amphibian (3)

- Beriev Be-112 (Russian Federation)
- Bombardier 415 (Canada)
- Laplan L-572 (Russian Federation)

Twin-jet amphibian (1)

- Beriev (Betair) Be-200 Altair (Russian Federation)

Twin-engine amphibian biplane (1)

- Hensley H-2 (United States)

Utility amphibian (2)

- Aero-Volga LA-8 Flagman (Russian Federation)
- RIDA 256 (Russian Federation)

Six seat amphibian (4)

- Beriev Be-103 Bekas (Russian Federation)
- Beriev (KnAAPO) SA-20P (Russian Federation)
- Rida Aleks-251 (Russian Federation)
- Warrior Centaur (United Kingdom)

Six-seat amphibian/kitbuilt (1)

- Seastar Seastar (United States)

Five-seat amphibian (3)

- Chernov Che-27 (Russian Federation)
- Laplan L-471 (Russian Federation)
- Seawind Seawind 300C (United States)

Four-seat amphibian (2)

- Beriev Be-101 (Russian Federation)
- Chernov Che-25 (Russian Federation)

Four-seat amphibian kitbuilt (3)

- Cobra Landseair (Australia)
- SG Sea Storm (Italy)
- Shearwater Shearwater (New Zealand)

Three-seat amphibian/kitbuilt (2)

- A-41 VNS-41 (Vietnam)
- Gidroplan Che-22 Korvet (Russian Federation)

Three-seat amphibian kitbuilt (1)

- Aeroprakt-24 (Ukraine)

Two-seat amphibian (2)

- Air Elite Storm Rally (United States)

- Chernov Che-23 (Russian Federation)

Two-seat amphibian kitbuilt (4)

- AirMax SeaMax (Brazil)
- Colyaer Freedom (Spain)
- SG Sea Storm (Italy)
- Quikkit Glass Goose (United States)

Two-seat amphibian /kitbuilt (2)

- EDRA Aeronautica Paturi (Brazil)
- Independent JB1 SeaDragon (United States)

Two-seat amphibian ultralight kitbuilt (2)

- Aerolites Aeroskiff (United States)
- WQS Seahawk (Germany)

Two-seat amphibian ultralight/kitbuilt (1)

- CZAW Mermaid (Czech Republic)

Two-seat flying boat kitbuilt (1)

- Colyear Gannet (Spain)

Class 9: Lightplane (factory built) (146)



Yakovlev Yak-54 1127941

Single-prop aircraft seating up to five persons and available only in complete form, unless otherwise stated. The US's LSA category includes some aircraft in Class 9 as well as others categorised as Ultralights, including homebuilts.

US Light Sport Aircraft

LSA rules for aircraft and Sport Pilot categorisation for pilots came into effect on 1 September 2004, affecting current and future aircraft with a gross weight of less than 598 kg (1,320 lb) only while flying in US territory. There are three sub-categories.

Sport Pilot – Experimental: Existing Experimental category aircraft (including amateur-builts, ultralights and flex-wings) which owners may, should they wish, transfer to Sport Pilot category registration before 31 January 2008.

Sport Pilot – Standard: Existing aircraft with a certificate of airworthiness specifying MTOW below 1,230 lb, including some versions of Aeronca, Luscombe, Piper Cub and Taylorcraft. These must continue to be maintained to FAA certification standards, but can be flown by Sport Pilots.

Special LSA: Factory-built, ready-to-fly aircraft designed and constructed in accordance with the ASTM (American Society of Testing and Materials) consensus standards for light-sport aircraft. S-LSA aircraft do not receive FAA type certification; once the first example in the US has been granted a certificate of airworthiness and that form (FAA 8130-7) lodged with the Experimental Aircraft Association, the design is taken as 'approved' and further machines are automatically accepted.

Those S-LSAs approved by January 2007 are given with their official US name, which may differ in some cases from the listing in *Jane's* because of marketing under the name of an American agent.

Aeropro EuroFox
Aerosport Ltd. Breezer
Aerosport Ltd. C42 Ikarus
Aerostar Festival
Aircraft Manufacturing & Development CH601XL
American Legend AL3C-100 Cub
ATEC 321 Faeta
B&F Technik Vertriebs FK-9 Mark IV
Colyear S100 Freedom

Cub Crafters CC11-100 Sport Cub
Czech Aircraft Works Parrot
Czech Aircraft Works Mermaid
Czech Aircraft Works Sport Cruiser
DOVA DV-1 Skylark
Evektor SportStar
Fantasy Air Allegro 2000
Flight Design CT
Gryf Aircraft Spol MD 3 Rider
Indus Aviation T211 Thorpedo
Iniziativa Industriali Italiane Sky Arrow 600 Sport
Jabiru USA Sport Aircraft J170-SP
Jabiru USA Sport Aircraft J250-SP
Jabiru USA Sport Aircraft Calypso-SP
Jihlavan Airplanes KP-5 Kappa
Just Aircraft Highlander
Luscombe Silvaire LSA-8
Rans S-7LS
Remos Aircraft G-3
Skykits USA Corp Savannah
Skykits USA Corp Savannah ADV
Storm Aircraft Rally LSA
Taylor Aviation Taylor Sport
Tecnam Bravo
Tecnam Echo Super
Tecnam Sierra
TL-Ultralight Sting Sport
Zlin Savage

Updates are available from www.sportpilot.org

Five-seat lightplane (2)

Diamond DA50 Super Star (Austria)
NLA AC-500 Air Car (China)

Four-seat lightplane (33)

Bellanca 17-30 Super Viking (United States)
Cessna 172 Skyhawk (United States)
Cessna 182 Skylane (United States)
Cessna T182T Turbo Skylane (United States)
Cessna NGP (United States)
Cirrus SR20 and SRV (United States)
Cirrus SR22 (United States)
Columbia Columbia (United States)
Diamond DA40D Diamond Star (Austria)
Diamond DA40-180 Diamond Star (Canada)
EADS PZL PZL-104M Wilga 2000 (Poland)
Evektor VUT 100 Cobra (Czech Republic)
FACI Fajr F-3 (Iran)
III Arrow F300 FSJ (Italy)
Ilyushin Il-103 (Russian Federation)
Mooney M20M Bravo (United States)
Mooney M20R Ovation 2 (United States)
Mooney M20TN Acclaim (United States)
Piper PA-28-161 Warrior III (United States)
Piper PA-28-181 Archer III (United States)
Piper PA-28-201 Arrow (United States)
QME 11E (United States)
Robin DR 400 Dauphin (France)
Robin DR 400/160 Major (France)
Robin DR 400/180 Régent (France)
Robin DR 500 Président (France)
SAIC LE-500 Little Eagle (China)
Solaris Sigma and Alpha (United States)
Socata TB 9 Tampico and TB10 and TB 200 Tobago (France)
Socata TB 20 and TB 21 Trinidad
Tiger AG-5B Tiger (United States)
UTVA-96 (Serbia & Montenegro)
Zlin Z 143 (Czech Republic)

Three-seat lightplane (3)

Aviaprom M-12 (Russian Federation)
Lilienthal X-34 Bekas (Ukraine)
PAC (AMF) Mushshak and Super Mushshak (Pakistan)

Three-seat biplane (1)

Waco Classic YMF Super (United States)

Primary prop trainer/sportplane (6)

Aerostar (Yakovlev) Iak-52 (Romania)
AII AVA-202 (Iran)
Alpha 120 (New Zealand)
NAL Hansa-3 (India)
PAC Airtrainer CT/4E (New Zealand)
PZL M26 Iskierka (Poland)
Zlin Z 242L (Czech Republic)

Aerobatic two-seat sportplane (10)

CAP 10 (France)
Extra EA-200 (Germany)
Extra EA-300 and EA-330 (Germany)
Interavia I-3 (Russian Federation)
MXR MX2 (United States)

Sukhoi Su-29 (Russian Federation)
Wingtip to Wingtip Panzl S-330 (United States)
Yakovlev/Strela Bear 360 (Russian Federation)
Yakovlev Yak-9U-M (Russian Federation)
Yakovlev Yak-54 (Russian Federation)

Aerobatic two-seat lightplane (4)

Aeromot AMT-600 Guri (Brazil)
Alpha 160 (New Zealand)
Grob G 120A (Germany)
LoPresti LP-1 Fury (United States)

Two-seat lightplane (68)

3Xtrim 3X55 Trener, 3X45 Ultra and 3X47 Ultra Plus (Poland)
Advanced Aero LSA-IVT (United States)
Aerostar Festival (Romania)
Aerostyle Breezer (Germany)
Air Elite Storm Rally (United States)
AMD Zenith CH 2000 Alarus (United States)
AMD Zenith CH601XL (United States)
American Champion 7EC Champ (United States)
American Champion 7ECA Citabria Aurora (United States)
American Champion 7GCAA Citabria Adventure (United States)
American Champion 7GCBC Citabria Explorer (United States)
American Champion 8GCBC Scout (United States)
American Champion 8KCAB Super Decathlon (United States)
American Legend Cub (United States)
Aquila A 210 (Germany)
ATAC Patriot II (United States)

Avantazh A-29 (Russian Federation)
Avantazh A-35 Scanner (Russian Federation)
Aviadesign A-16 Sport Falcon (United States)
Aviat Husky A-1 (United States)
Aviat Husky Pup (United States)
Aviatika-MAI-910 Interfly (Russian Federation)
Aviation Enterprises Magnum (United Kingdom)
CAG Toxo (Spain)
Cessna LSA (United States)
CLASS Kestrel (Canada)
Corvus Corone (Hungary)
CTRM Eagle 150 (Malaysia)
Cub Crafters CC18 Top Cub (United States)
Cub Crafters CC11 Sport Cub (United States)
Custom Flight Lite Star (Canada)
CZAW Parrot (Czech Republic)
Dean-Wilson Whitney Boomerang (Australia)
DF Alto (Czech Republic)
Diamond DA 20-C1 Katana (Canada)
Dorna D139-PT1 Blue Bird (Iran)
Dubna-2 Osa (Russian Federation)
Elitar 202 (Russian Federation)
Esqual VM-1 Esqual (Belgium)
Evektor Harmony (Czech Republic)
Flight Design CT (Germany)
Freebird Xtreme (United States)
Glass STOLGlass SG70 (Colombia)
Glass SpeedGlass (Colombia)
Griffon 100 (Russian Federation)
ICP SA2 Vimana (Italy)
III Sky Arrow (Italy)
III F-200 TSJ (Italy)
Impulse Impulse (Germany)
Interstate S-1B2 Arctic Tern (United States)
Ion Ion (United States)
IPE-06A (Brazil)
Issoire APM-20 Lionceau and APM-30 Lion (France)

Jihlavan KP 5 Rapid 500 (Czech Republic)
KLN VL-3 (Czech Republic)
Liberty XL-2 (United States)
Lightwing AC4 (Switzerland)
Luscombe Silvaire LSA-8 (United States)
MAI-217 (Russian Federation)
Maule M-4 (United States)
Nexaer LSI (United States)
Rans S-7LS Courier (United States)
Sauper Papango (France)
Scheibe SF-41 Zwergfalke (Germany)
Smith Piper PA-18 Super Cub (Canada)
SSVOBB Impuls (Netherlands)
Symphony SA 160 Symphony (Canada)
Taylorcraft F22 and Sport (United States)

Motor glider (9)

Aeromot Ximango (Brazil)
Diamond HK36 (Austria)
M+D AVO 68-R Samburo (Germany)
Paravar Pars Saba (Iran)
Scheibe SF25C Falke (Germany)
Stemme S10 and S15 (Germany)

Stemme S6, S8 and S15-8 (Germany)
Vans RV-11 (United States)
Whisper Whisper (South Africa)

Aerobatic two-seat biplane (2)

Aviat Pitts S-2C (United States)

Aerobatic single-seat sportplane (4)

SSH (Bücker) T-131 Jungmann (Poland)
CAP 232 (France)
Sukhoi Su-31 (Russian Federation)
Smolensk (Technoavia) SP-55M (Russian Federation)

Yakovlev Yak-3M (Russian Federation)

Aerobatic single-seat biplane (1)

SSH (Bücker) Jungmeister (Poland)

Glider tug (2)

Robin DR 400/180R Remo 180 (France)
Robin DR 400/200R Remo 200 (France)

Class 10: Utility kitbuilt (47)



Zenith Super STOL CH 801

0527136

This class reflects the growing number of kitbuilt aircraft intended for more than recreational use. The largest has 10 seats and turboprop power.

Private jet kitbuilt (1)

Comp Air CA-J Jet (United States)

Two-seat jet sportplane kitbuilt (1)

Viper ViperJet (United States)

Two-seat kitbuilt twin (2)

Lockwood AirCam (United States)
SlipStream Defiance (United States)

Utility turboprop kitbuilt (4)

Comp Air 7 (United States)
Comp Air 8 (United States)
Comp Air 10 (United States)
Comp Air 12 (United States)

Utility kitbuilt (1)

Khrunichev T-411 Aist (Russian Federation)

Six-seat turboprop kitbuilt (1)

Sreya Envoy (United States)

Six-seat kitbuilt (3)

ADI Super Stallion (United States)
Comp Air 6 (United States)
Murphy Super Rebel and Moose (Canada)

Four-seat kitbuilt twin (2)

Creative Flight Aerocat (Canada)
Hensley H-1 Wolf (United States)

Four-seat kitbuilt (27)

Aeronix Airelle (France)
Aviation Development Alaskan Bushmaster (United States)
AviPro Bearhawk (United States)
Avyron JG-803 (France)
CLASS Bush Caddy (Canada)
Comp Air 4 (United States)
Culp's Monoculp (United States)
Dream Tundra (Canada)
Dyn'Aero MCR4S (France)
Four Winds 210 and 250T (United States)
Hughes Australian Lightwing Speed 4000 (Australia)
Jabiru J Series (Australia)
KARI Firefly (Korea, South)
Lambert Mission M212 (Belgium)
Lancair Lancair IV, IVP and Sentry (United States)
Lancair Lancair ES and Super ES (United States)
Murphy Yukon (Canada)
Pulsar Cruiser and Super Cruiser (United States)
Ravin Ravin 500 (South Africa)
St Just Super Cyclone (Canada)
Tapanee Levitation 4 (Canada)
Team Tango Foxtrot (United States)
Vans RV-10 (United States)
Velocity XL-5 (United States)
Wag-Aero 2+2 Sportsman (United States)
Zenith Zodiac CH 640 (United States)
Zenith Super STOL CH 801 (United States)

Three-seat kitbuilt (4)

Comp Air 3 (United States)
 Aviaprom M-12 (Russian Federation)
 Murphy Rebel (Canada)
 Skygear Albatros (Korea, South)

Aerobatic three-seat biplane/kitbuilt (1)

Culp's Special (United States)

Class 11: Kitplanes and/or ultralights (280)**Aeroprakt-20 Sky Cruiser**

0525065

One- or two-seat, single-prop machines intended for private ownership. 'Kitbuilt' aircraft are in the lightplane category, unless described as ultralights (and flyable as such in at least some countries). Certain aircraft are available only in complete form, while kit manufacturers may offer the option of fly-away aircraft to those requiring the aeroplane, but not the assembly work. A forward slash (/) before the word 'kitbuilt' indicates that the aircraft is available complete or as a kit, as in 'ultralight/kitbuilt'; whereas an 'ultralight kitbuilt' is only available in pieces.

The upper weight limit is taken to be 544 kg (some 1,200 lb), although some national limits for ultralights are far lower. In the US, the new Light Sport Aircraft (LSA) category extends upwards to 598 kg (1,320 lb), meaning that several European ultralights, while well outside the US equivalent category, fall comfortably within the privileges of the Sport Pilot licence. Typical LSA aircraft appear in a separate list under Class 9, Lightplane (factory built).

Single-seat sportplane kitbuilt (4)

Bede BD-17 Nugget (United States)
 Flug Werk FW 190 (Germany)
 Loehle Spitfire Elite (United States)
 MSW Votec 351 (Switzerland)

Single-seat sportplane/kitbuilt (1)

Zivko Edge 540 (United States)

Single-seat ultralight/motor glider (3)

J&AS J6 Fregata (Poland)
 Noin Exel (France)
 TeST TST-13 Junior 2005 (Czech Republic)

Single-seat ultralight (3)

ATEC 212 Solo (Czech Republic)
 Just Plane Passions Vampire (Australia)
 Kolb Firefly (United States)

Single-seat ultralight kitbuilt (14)

Aerolites Bearcat (United States)
 Blue Yonder E-Z KingCobra (Canada)
 Brand RB-1 (Australia)
 Fisher Avenger (United States)
 Flightstar Spyder (United States)
 Flying Machines B612 (Czech Republic)
 Fly Synthesis Wallaby (Italy)
 Free Bird Sportlite 103 (United States)
 Kolb Firefly (United States)
 Mecklenburger Me-109 (Germany)
 Murphy JDM-8 (Canada)
 Sky Raider (United States)
 Slipstream Scepter (United States)
 Teknico Supa Pup Mk 4 (Australia)

Single-seat ultralight/kitbuilt (2)

Sapphire LSA Mk II (Australia)
 Silence Twister (Germany)

Single-seat ultralight biplane (1)

Aviatica MAI-890 (Russian Federation)

Single-seat ultralight biplane kitbuilt (3)

Fisher Youngster and Youngster V (United States)
 Great Plains Easy Eagle (United States)
 Yesteryear MiFyter (United States)

Single-seat ultralight motor glider/kitbuilt (2)

Ekolot JK-01a Elf (Poland)
 USA Cumulus (United States)

Single-seat motor glider ultralight (2)

AMS Carat A (Slovenia)
 Dewald Melos 3000 (Germany)

Tandem-seat kitbuilt (11)

Aerolab Camp (Italy)
 Airframes/Dakota Super 18 (United States)
 Blue Yonder E-Z Flyer (Canada)
 Custom Flight North Star (Canada)
 Dalastek S45 Mystère (Canada)
 LH-10 Ellipse (France)
 Rans S-7S Courier (United States)
 Rans S-19 (United States)
 Van's RV-4 (United States)
 Van's RV-8 and RV-8A (United States)
 Wag-Aero Sport Trainer (United States)

Tandem-seat sportplane kitbuilt (11)

Kimball Model 15 Raptor A S (United States)
 Kimball DR 109 (United States)
 Legend Legend (United States)
 MSW VOTEC 322 (Switzerland)
 New Century Radial Rocket (United States)
 Supermarine Spitfire (Australia)
 Swiss Light Revolution (Germany)
 Team Rocket F1 (United States)
 Titan T51 Mustang (United States)
 Warner Sportster (United States)
 Zivko Edge 540T (United States)

Tandem-seat turboprop sportplane kitbuilt (2)

Algie LP-1 (United States)
 Legend Turbine Legend (United States)

Tandem-seat turboprop sportplane/kitbuilt (1)

Cameron P-51G (United States)

Tandem-seat sportplane/kitbuilt (1)

Roland Bf 109G-2 (Germany)

Tandem-seat lightplane/kitbuilt (1)

US Light Aircraft Hornet (United States)

Tandem-seat ultralight (9)

Aeroprakt-30 (Ukraine)
 Albatross AS-3A (Russian Federation)
 DAR-21 Vector (Bulgaria)
 III Sky Arrow (Italy)
 Kolb Sling Shot (United States)
 Podesva UL Piper (Czech Republic)
 Lilienthal X-32 Bekas (Ukraine)
 Mára Wing L-1 Malamut (Czech Republic)
 VAM VAM-1 (Vietnam)

Tandem-seat ultralight kitbuilt (6)

Free Bird Sportlite 103 (United States)
 Just Summit (United States)
 Kolb Kolbra (United States)
 Lockwood Drifter and Super Drifter (United States)
 Rocky Mountain Ridge Runner (United States)
 Sky Raider Sky Raider II (United States)

Tandem-seat ultralight/kitbuilt (7)

Aeroprakt-20R-912 Sky Cruiser (Ukraine)
 HB Flugtechnik Cubby (Austria)
 Hughes Pocket Rocket (Australia)
 Podesva Trener Baby (Czech Republic)
 Storch Storch SS Mk 4 (Serbia & Montenegro)
 TL-232 Condor (Czech Republic)
 Zlin Aviation (Russo) Savage (Czech Republic)

Tandem-seat biplane kitbuilt (3)

Aviat (Christen) Eagle II (United States)
 Culp's Sopwith Pup (United States)
 Steen Pitts 14 (United States)

Tandem-seat biplane/kitbuilt (1)

Kimball (Pitts) Model 12 (United States)

Tandem-seat ultralight motor glider (1)

Airport Sonata (Czech Republic)

Tandem-seat ultralight biplane/kitbuilt (3)

B&F FK 12 Comet (Germany)
 Podesva C104 (Czech Republic)
 Hughes PR-Bipe (Australia)

Tandem-seat ultralight biplane kitbuilt (4)

Airlony Highlander (Czech Republic)
 Fisher R-80 and RS-80 Tiger Moth (United States)
 Murphy Renegade II (Canada)
 Murphy Renegade Spirit (Canada)

Tandem-seat twin/kitbuilt (1)

Aeroprakt-36 (Ukraine)

Tandem-seat ultralight twin/kitbuilt (1)

Aeroprakt-26 (Ukraine)

Side-by-side kitbuilt (32)

Aerocomp Merlin GT (United States)
 Aeronix Airelle (France)
 Airdale Flyer (United States)
 Airdale Magnum (United States)
 AirStart Griffin (Canada)
 Alpi Pioneer 200 (Italy)
 Alpi Pioneer 300 (Italy)
 Arion Lightning (United States)
 Aviation Enterprises Magnum (United Kingdom)
 Bushwhacker Air Bushwhacker (United States)

Creative Flight Aerocat (Canada)
 Custom Flight Lite Star (Canada)
 CZAW Parrot (Czech Republic)
 DAC Ranger (Netherlands)
 Dyn'Aero MCR01 (France)
 Glasair Super II (United States)
 Glasair III (United States)
 GlaStar GlaStar (United States)
 HB Flugtechnik HB 207 Alfa (Austria)
 Helisota LAK-X (Lithuania)
 HPA M1 Speedcruiser (United States)
 Kitfox Kitfox (United States)
 Lancair Legacy (United States)
 Pulsar Super Pulsar 100 (United States)
 Pulsar Sport 150 (United States)
 Slipstream Genesis (United States)
 Team Tango Tango 2 (United States)
 Ultravia Pelican (Canada)
 Van's RV-7 and RV-7A (United States)
 Van's RV-9 and RV-9A (United States)
 Van's RV-12 (United States)
 Wag-Aero Wag-A-Bond (United States)

Side-by-side sportplane kitbuilt (4)

Algie LP-1 (United States)
 Bede BD18 Nugget (United States)
 Kimball McCullochcoupe (United States)
 Nemesis NXT (United States)

Side-by-side sportplane/kitbuilt (1)

Dyn'Aero CR100, CR110 and CR120 (France)

Side-by-side lightplane/kitbuilt (14)

Avantazh Aeroprakt-27 (Russian Federation)
 Aero AT-3 (Poland)
 Aeroprakt-33 (Russian Federation)
 Brumby Brumby (Australia)
 Bushwhacker Bushcub (United States)
 CZAW Sport Cruiser (Czech Republic)
 EG Voyager VR 202 (Italy)
 Evektor SportStar (Czech Republic)
 Indus Thorpedo and Sky Skooter (United States)
 Sequoia Falco F.8L (United States)
 SG Storm (Italy)
 Tecnam P92 Echo (Italy)
 Tecnam P2002 Sierra (Italy)
 Tecnam P2004 Bravo (Italy)

Side-by-side lightplane/motor-glider kitbuilt (1)

Europa Europa (United Kingdom)

Side-by-side ultralight (44)

3Xtrim 3X55 Trainer, 3X45 Ultra and 3X47 Ultra
 Plus (Poland)
 Aeroálcool Quasar Lite (Brazil)
 Aeroandina MXP-1000 (Colombia)
 AeroJames Isatis 01 (France)
 Aeromoragón Stela (Spain)
 Aero Services Guepard and Guepy (France)
 Aerostar Festival (Romania)
 Airport Sonet (Czech Republic)
 ALMS J.300 Series 4 Joker (France)
 ALMS Papango (France)
 Aviakit Vega 3000 (France)
 B&F FK 9 (Germany)
 B&F FK 14 Polaris (Germany)
 Coavio DF 2000 (Italy)
 Colyaer Martin 3 (Spain)
 Corvus Corone (Hungary)
 Danex Eurocub (Hungary)
 DAR-23 Aksent (Bulgaria)
 Ekolot JK-05 Junior (Poland)
 Ekoflug MXP-740 (Slovakia)
 Elitar Sigma-4 (Russian Federation)
 Euroala Jet Fox 97 (Italy)
 Eurofly FB5 Star Light (Italy)
 Flight Design CT (Germany)
 Flying Machines FM 250 Vampire (Czech Republic)
 Fly Synthesis Texan (Italy)
 Fly Synthesis Manthos (Italy)
 Halley Apollo Fox (Hungary)
 ICP Savannah (Italy)
 Ikar Ai-10 Ikar (Ukraine)
 Impulse Impulse (Germany)
 Jihlavan KP 2U Rapid (Czech Republic)
 Kieger AK3 (France)
 KLN VL-3 (Czech Republic)
 Lambert Mission M106 (Belgium)
 Larus Larus (Czech Republic)
 LD Aviation MFI 9UL1 (Czech Republic)
 MB Avio C26 (Italy)
 Medway SLA 100 Executive (United Kingdom)
 Pipistrel Virus (Slovenia)
 SG Rally (Italy)
 Tecnam P96 Golf (Italy)

TL-96 Star and TL-200 Sting Carbon (Czech Republic)

Yak Aero Benelos (France)

Side-by-side ultralight kitbuilt (35)

Alisport Yuma (Italy)
Airdale Avid Flyer Mark IV (United States)
Airlony Skylane (Czech Republic)
Best Off Sky Ranger (France)
CAG Toxo (Spain)
Cobra Arrow (Australia)
Cobra Explorer (Australia)
Dart Dragonfly (South Africa)
Dyn'Aero MCR01 (France)
Euro Pingouin 152 (France)
Fisher Dakota Hawk (United States)
Flightstar IISL and IISC (United States)
Flyitalia MD3 Rider (Czech Republic)
Fly Synthesis New Wallaby (Italy)
FMP Qualt (Czech Republic)
Foxcon Terrier 2000 (Australia)
Free Bird Litesport Classic (United States)
German Aircraft Sky-MAXX (Germany)
Kolb Laser 2 (United States)
Kolb Mark III Xtra (United States)
Lobb Falco 95 (Slovakia)
Murphy Maverick (Canada)
Noin Choucas (France)
Nordic 8 Mini Explorer (Canada)
Raj Hamsa X-Air (India)
Rans S-6 Coyote II (United States)
Rans S-12XL Airaile and S-12S Super Airaile (United States)
Reality (Just Plane) Escapade (United Kingdom)
Skygear Bikini (Korea, South)
SlipStream Revelation (United States)
Sonex Sonex (United States)
Teknico AeroPup (Australia)
Zenith Zodiac CH 601HD (United States)
Zenith Zodiac CH 601XL (United States)
Zenith STOL CH 701 (United States)

Side-by-side ultralight/kitbuilt (41)

Aerodynos JA-177 Evolution (Colombia)
Aeronix Airelle (France)
Aeroprakt-22 (Ukraine)
Aeropro Eurofox (Slovakia)
Aerospool WT-9 Dynamic (Slovakia)
Aerostyle Breezer (Germany)
ALMS Jodel D 20 (France)
ATEC Zephyr and Faeta (Czech Republic)
AveoTech Aveo X, XT and XTC (United States)
Brumby Brumby (Australia)
CLASS Kestrel (Canada)
DF Alto (Czech Republic)
EG Voyager VR 202 (Italy)
Esqual VM-1 Esqual (Belgium)
Evекtor teamEurostar (Czech Republic)
Fantasy Air Allegro and Arius (Czech Republic)
Fläming Air FSU Smaragd (Germany)
Fly Synthesis Storch (Italy)
G1 Aerospace Guérin G1 (France)
GM+T Pretty Flight (Romania)
Hughes Australian LightWing GR-912 (Australia)
Hughes Australian LightWing Sport 2000 (Australia)
Hughes Australian LightWing Speed (Australia)
Humbert Tétrás (France)
Ikarus C42 (Germany)
Interplane Skyboy (Czech Republic)
Jabiru Jabiru (Australia)
Jabiru J160 Series (Australia)
Jihlavan KP 5 ASA Rapid 500 (Czech Republic)
Opus ARV Super2 (United States)
OSKBES MAI-223 Kityonok (Russian Federation)
Podesva UL Tulák (Czech Republic)
Protoplane Ultra (France)
Raj Hamsa Hanuman (India)
Remos G-3 Mirage (Germany)
Swiss Light D4 BK Fascination (Germany)
Swiss Light D5 Evolution (Germany)
ULBI Wild Thing (Germany)
Urban UFM-10 Samba (Czech Republic)
Urban UFM-13 Lambáda (Czech Republic)

Side-by-side ultralight biplane (1)

Aviatica-MAI-890 (Russian Federation)

Side-by-side ultralight biplane kitbuilt (1)

Yesteryear Bifyter (United States)

Side-by-side ultralight motor glider kitbuilt (2)

Flaming Air FA 03 Smaragd TMG (Germany)
Sonex Xenos (United States)

Side-by-side motor glider kitbuilt (1)

Cobra Arrow (Australia)

Side-by-side motor glider ultralight (1)

AMS Magnus (Slovenia)

Side-by-side ultralight/motor glider/kitbuilt (3)

Noin Excel (France)
Pipistrel Sinus (Slovenia)
Protoplane Massai (France)

Side-by-side ultralight twin (1)

Airox F-31 (Czech Republic)

Class 12: Rotary wing (153)



Kawasaki OH-1

1121801

Includes tiltrotors, autogyros and lifting platforms. Light utility helicopters are those not exceeding 5,000 kg (11,023 lb) maximum take-off weight.

Attack helicopter (8)

Bell 449 SuperCobra (United States)
Boeing AH-64 Apache (United States)
Denel AH-2 Rooivalk (South Africa)
Eurocopter 665 Tiger/Tigre (International)
Fuji (Boeing) AH-64D (Japan)
Kamov Ka-50 Chernaya Akula (Russian Federation)
Kamov Ka-52 Alligator (Russian Federation)
Mil Mi-28 (Russian Federation)

Armed observation helicopter (3)

Bell RAH-70 (United States)
HAL Lancer (India)
Kawasaki OH-1 (Japan)

Naval combat helicopter (4)

CHAIG Z-8 (China)
Kaman (K894) SH-2G Super Seasprite (United States)
Mitsubishi (Sikorsky) SH-60 (Japan)

Sikorsky S-70B (United States)

Heavy lift helicopter (3)

Eurocopter HTH (International)
Mil Mi-26 (Russian Federation)
Sikorsky CH-53X (United States)

Medium lift helicopter (2)

Boeing 114 and 414 Chinook (United States)
Kawasaki (Boeing) CH-47J Chinook (Japan)

Light lift helicopter (1)

Kaman K-1200 K-MAX (United States)

Medium transport helicopter (7)

Kamov Ka-29 (Russian Federation)
Kamov Ka-60 Kasatka (Russian Federation)
Kazan Ansat-3 Maksimum (Russian Federation)
Kazan/Mil Mi-17 (Russian Federation)
Mil Mi-38 (Russian Federation)
Mitsubishi (Sikorsky) UH-60 (Japan)
Sikorsky S/H-92 (United States)

Multirole medium helicopter (20)

Agusta-Bell 412 and Griffon (International)
AgustaWestland A139 (International)
AgustaWestland A149 (International)
AgustaWestland EH101 (International)
Bell 412 (Canada)
Bell UH-1Y (United States)
CHRDZ Z-10 (China)
Dirgantara (Eurocopter) NAS-332 Super Puma (Indonesia)
Eurocopter Super Puma Mk I and Cougar Mk I (International)
Eurocopter Super Puma Mk II and Cougar Mk II (International)
HAL LCH (India)
Kamov Ka-32 (Russian Federation)
Kamov Ka-62 (Russian Federation)
Kawasaki (AgustaWestland EH101) KHI-01 (Japan)
Mil Mi-17 (Mi-8M), Mi-19, Mi-171 and Mi-172 (Russian Federation)
Mil Mi-54 (Russian Federation)
NHIndustries NH90 (International)
PZL W-3 Sokół (Poland)
Sikorsky S-70A (United States)
Sikorsky S-76 (United States)

Light utility helicopter (40)

AgustaWestland A 109 (International)
AgustaWestland A 109S Grand (International)

AgustaWestland A 119 Koala (International)

AgustaWestland Lynx (International)

Bell 206B-3 JetRanger III (Canada)

Bell 206L-4 LongRanger IV (Canada)

Bell 407 (Canada)

Bell 417 (Canada)

Bell 427 (Canada)

Bell 429 Globalranger (Canada)

Bell 430 (Canada)

CHAIG Z-11 (China)

Enstrom 480 and TH-28 (United States)

Eurocopter AS 350 Ecureuil/ASStar and AS 550

Fennec (International)

Eurocopter AS 355 Ecureuil 2/TwinStar and AS

555 Fennec (International)

Eurocopter AS 365N Dauphin 2 and AS 565

Panther (France)

Eurocopter EC 130B (International)

Eurocopter EC 135 and EC 635 (France)

Eurocopter EC 155B (International)

Eurocopter EC 120 B Colibri (International)

Eurocopter BK 117 (International)

Eurocopter EC 145 (International)

Eurocopter UH-72A Lakota (International)

FH-1100 FPhoenix (United States)

HAI (Eurocopter) Z-9 Haitun (China)

HAI Z-X (China)

HAL Dhruv (India)

HAL Cheetah and Cheetal (India)

HAL Chetak and Chetan (India)

IAMI (HESA) Shahed 278 (Iran)

IRGC Shahed 274 (Iran)

KAI (Bell) 429 (Korea, South)

KAI KUH (Korea, South)

Kamov Ka-226A Sergei (Russian Federation)

Kazan Ansat (Russian Federation)

MD 500 and MD 530 (United States)

MD 520N (United States)

MD 600N (United States)

MD Explorer (United States)

PZL SW-4 (Poland)

AEW helicopter (1)

Kamov Ka-31 and Ka-35 (Russian Federation)

Four-seat helicopter (3)

Mil Mi-34 (Russian Federation)
Robinson R44 (United States)
Schweizer 330 and 333 (United States)

Three-seat helicopter (5)

Enstrom F28 and 280 (United States)
Kazan Aktai (Russian Federation)
MK Helicopter MK 3 (Germany)

Mil Mi-60 (Russian Federation)

Schweizer 300C (United States)

Three-seat helicopter kitbuilt (1)

Pawnee Chief (United States)

Two-seat helicopter (5)

Aerocopter AK-13 (Ukraine)
DFH Dragon 334 (Italy)
Guimbal Cabri G2 (France)

Istra Istra (Russian Federation)

Robinson R22 (United States)

Four-seat helicopter kitbuilt (1)

VAT Hummingbird (United States)

Two-seat helicopter kitbuilt (3)

Aviotecnica ES-101 Raven (Italy)

Dynali H2 (Belgium)

Rotorway Exec 162F (United States)

Two-seat helicopter/kitbuilt (1)

Aerokopter AK-13 (Ukraine)

Two-seat ultralight helicopter (1)

NA Design NA 40 Bongo (Czech Republic)

Two-seat ultralight helicopter kitbuilt (4)

ASII Ultrasport 496 (United States)

Aviotecnica ES-101 Raven (Italy)

Helisport CH-7 Kompress (Italy)

Helo Werks HX-1 Wasp (United States)

Single-seat ultralight helicopter (1)

Winner M500 (Belgium)

Single-seat ultralight helicopter kitbuilt (4)

ASII Ultrasport 254 and 331 (United States)

Eagle Helicycle (United States)

Innovator Mosquito (Canada)

Yoshine EzyCopter (Taiwan)

Four-seat autogyro (1)

Groen Hawk 4 (United States)

Three-seat autogyro (2)

Aero-Astra Okhotnik (Russian Federation)

Irkut A-002 (Russian Federation)

Two-seat autogyro kitbuilt (1)

Butterfly Golden Butterfly (United States)

Two-seat autogyro ultralight (2)

Aerocopter Futura (Spain)
 Autogyro Europe MT-03 (Germany)
 ELA-07 (Spain)
 NewGen CARLA (United Kingdom)
 Proair Skywalk (Czech Republic)

Two-seat autogyro ultralight kitbuilt (4)

ABS Xenon (France)
 Air Command Commander Elite (United States)
 Little Wing Roto Pup (United States)
 RAF 2000 (Canada)

Two-seat autogyro ultralight (2)

American Autogyro Sparrowhawk (United States)
 Magni M 16 Tandem Trainer (Italy)
 Magni M 22 (Italy)
 Chayair Sycamore (South Africa)

Single-seat autogyro (1)

Ustinov Adel' (Russian Federation)

Single-seat autogyro ultralight (3)

Gyrotec DF 02 (Germany)
 Magni M 20 Talon (Italy)
 MAI-205 (Russian Federation)

Single-seat autogyro ultralight kitbuilt (4)

Air Command Commander Elite (United States)
 Butterfly Super Sky Cycle (United States)
 Layzell AV-18 (United Kingdom)
 Little Wing Roto-Pup (United States)

New-concept rotorcraft (3)

Bell Modular Affordable Product Line (Canada)
 Piasecki Vectored Thrust Ducted Propeller (United States)
 Sikorsky X2 (United States)

Lifting vehicle (5)

Lifium HAL (France)
 PAM 100B Individual Lifting Vehicle (United States)
 Trek Dragonfly UMR 1 (United States)
 Urban Aero CityHawk (Israel)
 Urban Aero X-Hawk (Israel)

Exoskelitor flying vehicle (2)

Gen H-4 (Japan)
 Trek Springtail EFV-4 (United States)

Light utility tiltrotor (1)

Bell/Agusta BA609 (International)

Multimission tiltrotor (3)

Bell Quad Tiltrotor (United States)
 Bell Boeing V-22 Osprey (United States)
 Eurotilt (International)

Convertiplane (3)

Carter CarterCopter CC1 (United States)
 Carter PAV 2+2 (United States)
 Groen Gyrolifter (United States)

Class 13: Lighter than air (32)

Lightship A-60+

0558597

All are (at least broadly) cylindrical dirigibles, unless otherwise specified.

Helium rigid (1)

Navy High-Speed Airship (United States)

Helium semi-rigid (3)

Lifium Lifium series (France)
 TAG AG (Malaysia)
 Zeppelin NT (Germany)

Helium non-rigid (15)

ABC Lightship A-60+ (United States)
 ABC Lightship/Spector Series (United States)
 Aeros 40 Sky Dragon (United States)
 Evolution FS 200 Friendship 200 (Germany)
 RosAeroSystems Au-11 (Russian Federation)
 RosAeroSystems Au-12 (Russian Federation)
 SkyCat AT-10 (United Kingdom)
 Skycruiser Skyship 500HL (United States)
 Skycruiser Skyship 600 (United States)
 Skycruiser Skyship 1000 (United States)
 SVAM CA-80 Vantageship (China)
 SVAM CA-120 Vantageship (China)
 USAI ULI and UL2 (United States)
 Voliris 900 (France)
 Winderafter CA 108 (United States)

Helium non-rigid special shape (3)

21st Century SPAS-R1 (Canada)
 TSI SA 60 (United States)
 TSI SA 90 (United States)

Hybrid rigid air vehicle (2)

DARPA Walrus (United States)
 Ohio Dynalifter (United States)

Hybrid semi-rigid air vehicle (1)

JP Aerospace Ascender (United States)

Hybrid non-rigid air vehicle (1)

SkyCat SkyCat (United States)

Hybrid buoyant aircraft (2)

Aeros Aircraft (United States)
 Lockheed-Martin P-791 (United States)

Hot air non-rigid (4)

Avgur Au-29 Zyablik (Russian Federation)
 Avgur Au-35 (Russian Federation)
 Gefa-Flug AS 105 GD (Germany)
 Kubicek AV-2 (Czech Republic)

Jane's Users' Charter

This publication is brought to you by Jane's Information Group, a global company with more than 100 years of innovation and an unrivalled reputation for impartiality, accuracy and authority.

Our collection and output of information and images is not dictated by any political or commercial affiliation. Our reportage is undertaken without fear of, or favour from, any government, alliance, state or corporation.

We publish information that is collected overtly from unclassified sources, although much could be regarded as extremely sensitive or not publicly accessible.

Our validation and analysis aims to eradicate misinformation or disinformation as well as factual errors; our objective is always to produce the most accurate and authoritative data.

In the event of any significant inaccuracies, we undertake to draw these to the readers' attention to preserve the highly valued relationship of trust and credibility with our customers worldwide.

If you believe that these policies have been breached by this title, you are invited to contact the editor.

A copy of Jane's Information Group's Code of Conduct for its editorial teams is available from the publisher.

www.janes.com

Jane's

Intelligence and Insight You Can Trust

First Flights

Some of the first flights made during 2006



The present trend for longevity in military aircraft will make the closing days of 2006 significant until the middle of the 21st Century. Lockheed Martin's F-35 Lightning II Joint Strike Fighter climbs skyward at Fort Worth on 15 December

1154709

Argentina

LMAASA AT-63 Pampa NG, first to 13 Feb
production standard (E-816; converted
prototype EX-02)

Australia



Dean-Wilson Whitney Boomerang (VH-AAV)

1154713

Dean-Wilson Whitney Boomerang 6 Jul
(VH-AAV)

Austria



Diamond D-Jet

1154710

Diamond Aircraft D-Jet (C-GVLJ) 18 Apr

Canada



Bombardier Challenger 605

1154714

Bombardier Challenger 605 (C-FGYM) 22 Jan



Big Flapper ornithopter

1154711

UTIAS Big Flapper (C-GPTR) 8 Jul

China



HAIC L-15 advanced trainer

1154715

HAIC L-15 (01) 13 Mar
CAC FC-1/JF-17 Xiaolong, third 28 Apr
prototype (04)
CAC FC-1/JF-17 Xiaolong, fourth 10 Sep
prototype (06)
Hafei FY550 18 Oct

Czech Republic



Wolfsberg Corvus 1F

1154712

Wolfsberg-Letov Corvus 1F (OK-WLT) 6 Jun



Evektor Super Cobra

1154716

Evektor VUT100-131i Super Cobra 24 Oct
(OK-RAF)

France

Socata TBM 850, first production 23 Jan
(F-WWRE/N850TB)
Balaskovic Alizé airship (W17-OD) 6 Sep
(first untethered flight)
Best Off Sky Ranger Swift 912S **Oct
(G-UPHI)

Germany



Impulse Xtreme

1154717

Impulse Xtreme 3000 (D-EYKS) 19 May
Grob SPⁿ second prototype (D-CGSP) 29 Sep
(destroyed 29 November 2006)

India



Tejas fifth prototype 1154721
ADA LCA Tejas, fifth prototype (PV3/KH2005) 1 Dec

International

AgustaWestland KH-101, first assembled by Kawasaki (8651) 15 Feb
Airbus A310-300, Advanced Refuelling Boom System testbed (EC-HLA) 16 Mar
Airbus A330-200 MRTT, first for RAAF (F-WWY1) 30 Mar



South African Lynx 1154718
AgustaWestland Super Lynx 300, first for South African Navy (ZK115/191) 24 Apr
Eurocopter EC 145 Advanced Technology Rotor testbed (D-HMBK) 26 Apr
Airbus A380-800, third prototype (MSN003/F-WWSA/9V-SKA) 7 May
Eurocopter AS 532AL Cougar Mk I, first for Bulgarian Air Force (F-ZKBL/701) 9 May
NH Industries NH 90, first NFH for French Navy (F-ZWTO) 12 May
Airbus A319ACJ, first for Czech Air Force (D-AVWU/2801) 3 Jul
Airbus A380-800, fourth prototype (F-WWSB) 19 Jul



GAP (Farnborough) Kestrel 1154722
GAP Kestrel JP100/FACL F1 (N352F) 29 Jul
Airbus A380-800, first flight with passengers (MSN002/F-WXXL) 4 Sep



EH101 with BERP blades 1154719
AgustaWestland EH101, first flight in BERP IV upgrade configuration (G-17-510) 26 Sep
Airbus A318-100 Elite (D-AUAA/F-WWIB/HB-IPP) 10 Oct
Airbus A380-800, fifth prototype, first with GP7200 engines (MSN009/F-WWEA) 25 Aug



Second BA609 1154723
Bell/Agusta BA609, second prototype (N609AG) 9 Nov
Airbus A380-800, sixth prototype (MSN006/F-WWSC) 17 Nov
NH Industries NH 90, first NFH for Royal Norwegian Air Force (013) 20 Dec

Italy



Initial AMI C-27J 1154720
Alenia C-27J Spartan, first for Italian Air Force (MM62215) 24 Jul

Japan



Fuji/Boeing Apache 1154724
Boeing AH-64DJP Apache, first Fuji-assembled aircraft for JGSDF (N3216N/02-0004/74501) 25 Jan
Tokyo Institute of Technology experimental aircraft flew for 59 seconds powered solely by 160 AA-size batteries 16 Jul

Netherlands

DAC RangerR prototype (PH-DAC) 15 Sep

New Zealand

Alpha 160A, first New Zealand-built (ZK-FXY) 12 Apr

Russian Federation

Tupolev Tu-204-120CE, first for Air China Cargo (RA-64030) 14 May



Sukhoi Su-80GP 1154725
Sukhoi Su-80GP, first pre-production (unmarked; c/n 01-05) 29 Jun
Sukhoi Su-34, first production (01) 12 Oct

Switzerland

MSW Aviation Votec 351 (HB-YMV) 23 Sep

Taiwan



Prototype AIDC F-CK-1C 1154729
AIDC F-CK-1C Shiang-Seng IDF (converted F-CK-1A 95-8136) 9 Oct

United Kingdom

BAE Systems Hawk Mk 132, first for Indian Air Force (ZK121/HT001) 13 Dec

United States

Advanced Aero Vortex (N101VX) 6 Jan



Spectrum S-33 Independence 1154726
Spectrum Aeronautical Spectrum S-33 Independence (N322LA) (crashed 25 July) 7 Jan
Cessna 510 Citation Mustang, second production (N510KS) 27 Jan
Lockheed Martin P-791 airship (N791LM) 31 Jan
Carter 002 CGD-T (N899CC) ** Jan



AdamJet first production 1154730
Adam Aircraft A700 AdamJet, first production (N700LJ) 6 Feb
Arion Lightning (N233AL) 3 Mar



First F-16 for Poland 1154727
Lockheed Martin F-16C Block 52, first for Polish Air Force (03-0040/4040) 14 Mar
Mooney M20TN Acclaim (N311TN) 16 Mar
Cessna 560 Citation Encore+, first production (N560CC) 22 Mar
Bombardier Learjet 60^{XR} (N50163) 3 Apr
Boeing/DARPA X-37, first air-launched flight 7 Apr



Excel-Jet Sport-Jet 1154731
Excel-Jet Sport-Jet (N350SJ) (crashed 22 June) 13 May

FIRST FLIGHTS

Gulfstream G550, first Nachshon
conformal AEW version for Israel
(N637GA/637) 20 May

Tri-State Aviation P-51A Mustang
replica (N8082U) 7 Jun

Cessna Citation Mustang, third (first
Independence-built) production
(N403CM) 15 Jun



Cessna NGP 1154732

Cessna Next Generation Piston (NGP)
(N99110) 23 Jun

Bell 445 ARH-70A, first for US Army
(N44515) 20 Jul

Boeing EA-18G Growler (166641) 15 Aug



Seawind 300C 1154733

Seawind Seawind 300C, first production
(C-GDBS) 31 Aug

Boeing 737-900ER (N900ER/PK-LAG) 1 Sep

Boeing 747-400 Dreamlifter (Large
Cargo Freighter) (N747BC) 9 Sep



Golden A-67 Dragon 1154736

Golden Aviation/US Aircraft A-67
Dragon (N906US) 6 Oct



Cessna LSA 1154734

Cessna Light Sport Aircraft (N158CS) 13 Oct



Nexaer LS-1 1154737

Nexaer LS1 (N103XR) (*runway hop
only*) 16 Oct

Boeing CH-47F Chinook, first
production 23 Oct



Skyacht Personal Blimp 1154735

Skyacht Aircraft Personal Blimp *Alberto*
(N111SY, registered as Nachbar SY-1)
(*first untethered flight*) 27 Oct

Boeing C-17A Globemaster III, first for
Royal Australian Air Force (A41-206) 7 Nov

Van's RV-12 (N912VA) 9 Nov

Boeing EA-18G Growler, second
production (166642) 10 Nov

Lockheed Martin F-35A Lightning II,
first prototype (AA-1) 15 Dec

Boeing KC-767, first for Japan Air Self-
Defence Force (N763TT) 21 Dec



Gulfstream Nachshon

1154762

Aerospace Calendar

Some significant aerospace events in 2006



2006 was the year in which Embraer completed the introduction to service of its four-member E-jet family, the last being the Embraer 195, delivered to Flybe on 1 September 1154743

2006	Military aviation	Civil aviation	2006	Military aviation	Civil aviation
3 Jan	Sikorsky awarded system development and demonstration (SDD) contract for CH-53K heavy lift helicopter	Sikorsky Aircraft announced that it had received FAA certification for the S-76C++		First (UK-built) AgustaWestland KHI-01 (EH101) handed over to Japan Maritime Self-Defence Force	
12 Jan	US Army cancelled contract with Lockheed Martin for Aerial Common Sensor replacement for the Beechcraft RC-12 Guardrail		14 Mar		Delivery of 250th Bombardier CRJ700 regional jet (to SkyWest)
23 Jan		First production EADS Socata TBM 850 turboprop made initial flight on same day as award of FAA certification	21 Mar	Hungarian Air Force accepted delivery of its first five Saab JAS 39 Gripen multirole fighters at Kecskemet	Last Dornier airliner, a 328JET, delivered to Iceland for Nordic Wings (leased to City Star)
Jan		First flight of Carter PACV 2+2 convertiplane	22 Mar		First flight of Cessna Citation Encore+ at Cedar Rapids, Iowa
1 Feb		First flight of 5,000th Boeing 737; delivery accomplished 13 Feb to Southwest Airlines	23 Mar	First production HC-144A (CN-235) for US Coast Guard rolled out by EADS CASA at San Pablo, Seville	
17 Feb	Critical design reviews of F-35A and F-35B versions of Lockheed Martin Joint Strike Fighter successfully concluded		Mar	Algeria placed order for 28 Sukhoi Su-30MKA multirole fighters	
19 Feb	First SDD Lockheed Martin F-35 Joint Strike Fighter rolled off production line at Fort Worth, Texas		4 Apr		Arion Lightning kitbuilt aircraft made public debut at Sun 'n' Fun, Lakeland, Florida, along with Aviadesign A-16 Sport Falcon, HeloWerks HX-1 Wasp ultralight kitbuilt helicopter, Aerolab Lo-Camp and several Light Sport versions of existing designs
23 Feb		Mooney Airplane Company delivered its 11,000th production aircraft; the milestone machine was an Ovation2 GX, which was accepted by Dennis Strigl of New Jersey			
Feb	Production of first wing assembly for Airbus Military A400M began at Filton, UK				
					
First operational F-22A Raptor 1154739			The 4,000th F-16 Fighting Falcon 1154740		
3 Mar	USAF 94th FS receives the first Lockheed Martin F-22A Raptor destined for an operational squadron	First flight of prototype Arion Lightning kitbuilt aircraft	20 Apr	Hand-over of 4,000th Lockheed Martin Fighting Falcon, an F-16C for Oman	
			28 Apr		Pilatus delivered 600th PC-12 business turboprop aircraft
			13 May		First flight of prototype Excel-Jet Sport-Jet
			23 May		Manufacture of commercial aircraft at Long Beach, California, ended with delivery of the last two Boeing 717 jetliners

2006	Military aviation	Civil aviation
30 May	Rostvertol announced delivery of first series production Mil Mi-28N Night Hunter attack helicopter to Russian Air Force	
2 Jun	First Airbus A330 tanker for Royal Australian Air Force delivered to CASA of Spain for modifications	
29 Jun	Contract covering supply of additional 34 NHIndustries MRH90 helicopters for service with Army and Navy signed by Australia	
30 Jun	Eurocopter EC-145 announced as winning contender in US Army Light Utility Helicopter competition; subsequently designated UH-72A Lakota	Brazilian ANAC certification awarded to Embraer 195 regional jet airliner
1 Jul	Raytheon Sentinel R. Mk 1 made its public debut at RAF Waddington air show	
6 Jul	First production Sukhoi Su-34 'Fullback' rolled out at Novosibirsk	



F-35 Lightning II naming ceremony 1154744

7 Jul	Formal unveiling of Lockheed Martin F-35 at Fort Worth accompanied by announcement that Lightning II name had been chosen for the Joint Strike Fighter	
17 Jul		Mockup of the joint Bell-Urbaironautics X-Hawk 'flying car' shown at Farnborough International. 'XWB' re-draft of Airbus A350 design is revealed; Sukhoi RRJ is renamed Superjet 100
19 Jul	AgustaWestland released details of proposed AW149 medium multirole battlefield helicopter at Farnborough Air Show	
21 Jul	Sukhoi announced that it had received a contract from Venezuela covering supply of 30 Su-30MK multirole fighters	
24 Jul	Start of integrated fuselage assembly process for first Airbus Military A400M at Bremen, Germany	Opening of EAA AirVenture '06 at Oshkosh. Cessna unveiled LSA (Light Sport Aircraft) and made surprise fly-by of NGP (Next Generation Piston) prototypes. Other debuts included Vans Aircraft RV-12 proof-of-concept prototype. Cessna celebrated 50 years of Model 172/182 and production of 65,000 of this family; Honda announces decision to market the HondaJet
25 Jul	Final assembly of first Airbus Military A400M wing began at Filton, UK	

2006	Military aviation	Civil aviation
26 Jul		First production Mooney Ovation3 handed over to customer, Andre Kulaga, at EAA AirVenture, Oshkosh
31 Jul	First new production Sikorsky UH-60M Black Hawk utility helicopter rolled out	



First EA-18G Growler (Marv Lynchard, USAF) 1154741

3 Aug	Roll-out of first EMD Boeing EA-18 Growler at St Louis	
15 Aug	First flight of Boeing EA-18G Growler electronic warfare aircraft	
1 Sep		Flybe became the first customer to take delivery of an Embraer 195 regional jet airliner First flight of Boeing Next Generation 737-900ER at Seattle



The 700th of the ATR 42/72 family 1154745

8 Sep		Air Deccan takes delivery of the 700th ATR turboprop airliner
12 Sep	Last of 11 AgustaWestland A109 light observation helicopters handed over to Royal Malaysian Army at Vergiate, Italy	
13 Sep		Eurocopter handed over 400th production example of the EC120 since deliveries began in 1998 (to Sacramento County Sheriff's Department)
15 Sep	First engine run accomplished by Lockheed Martin F-35 Lightning II	
19 Sep	Gulfstream Aerospace handed over its first Conformal Airborne Early Warning (CAEW) special-mission aircraft to Israel	
27 Sep	First production examples of the UH-1Y and AH-1Z handed over to US Marine Corps at Bell's Amarillo, Texas, facility	



Last of the Bombardier CL-604 line

1154742

- 3 Oct
- Bombardier announced roll-out of 365th and last production Challenger 604 business jet at Montreal-Dorval; delivery to customer was expected in early 2007
- 13 Oct
- BAE Systems' 20 per cent share in Airbus was acquired by EADS for EUR2.75 billion, making EADS now the sole owner of Airbus
- 16 Oct
- Announcements on the eve of the NBAA Convention in Orlando, Florida, included Hawker 750 and 900XP, Spectrum S-40 Freedom
- 17 Oct
- Aircraft unveiled at NBAA Convention were Cessna Citation CJ4, Cessna XLS+, Cessna LCC and Piper PA-47 PiperJet



First autonomous aerial refuelling

1154746

- 25 Oct
- Omega Boeing KC-707 tanker and NASA Boeing F/A-18 Hornet receiver make the first autonomous aerial refuelling contact
- 26 Oct
- Airbus signed a framework agreement with a Chinese consortium concerning creation of a final assembly line in China for the A320 family of airliners
- Oct
- Cessna Aircraft Company completed production of the 7,000th single-engined piston aircraft to be manufactured at Independence, Kansas; the milestone aircraft was a Cessna 182 Skylane



Chinese-built Diamond Star

1154747

- Oct
- Diamond Aircraft's Chinese factory rolled out its first DA40 Diamond Star

- 2006
- Military aviation
- Civil aviation
- 3 Nov
- Singapore became first customer for Pilatus PC-21 turboprop trainer, ordering a total of 19 aircraft
- 7 Nov
- Cessna delivered the 100th production Citation Sovereign business jet
- 9 Nov
- Cirrus Design Corporation announced that it had produced its 3,000th aircraft since the first delivery in 1999
- 14 Nov
- Netherlands became first country to commit to production, sustainment and follow-on development (PSFD) phase of Lockheed Martin F-35 Lightning II programme with signature of MoU
- 16 Nov
- First two PZL-Swidnik SW-4 training helicopters delivered to Polish Air Force
- 22 Nov
- First Cessna Citation Mustang business jet delivered
- 28 Nov
- First of four Boeing C-17A Globemaster III strategic transport aircraft handed over to the Royal Australian Air Force at Long Beach, California



Lockheed's 2,300th Hercules is rolled out

1154751

- 29 Nov
- The 2,300th production example of the Lockheed Martin C-130 Hercules was delivered, this being a KC-130J Super Hercules tanker for the US Marine Corps rolled out on 4 October
- 1 Dec
- Airbus received authorisation to proceed with industrial launch of the A350 XWB Family
- 6 Dec
- EADS CASA delivered the first HC-144A (CN-235) to Lockheed Martin for final fitting out and eventual hand-over to the US Coast Guard
- 7 Dec
- Lockheed Martin F-35 Lightning II moved under own power for first time and accomplished low-speed taxi test at Fort Worth, Texas



Eurocopter UH-72A Lakota hand-over and naming

1154748

- 11 Dec
- Hand-over and naming ceremony for US Army's first Eurocopter UH-72A Lakota

2006	Military aviation	Civil aviation	2006	Military aviation	Civil aviation
	Canada confirmed involvement in PSFD for Lockheed Martin F-35 Lightning II by signing MoU			First two production examples of the Sukhoi Su-34 'Fullback' delivered to Russian Air Force	
12 Dec		AgustaWestland delivered the first US-assembled AW 139 (to Seacor Holdings) from its Philadelphia plant, accompanied by an A 109 Power and an A 119 Koala	21 Dec		FAA certification awarded to Cessna Citation Encore+
			29 Dec	China officially admits to existence of CAC J-10 multirole fighter, nearly three years after it entered service with the PLAAF	
13 Dec	The German Army became the first customer to receive production examples of the NH90 TTH (Tactical Transport Helicopter) with delivery of the first two at Donauwörth		31 Dec		The first customer Eclipse 500 was delivered to co-owners David Crowe, a private owner, and Jet-Alliance, a shared jet ownership company in Westlake Village, California
15 Dec	First flight of first SDD Lockheed Martin F-35A Lightning II at Fort Worth, Texas				



Delayed deliveries of the NHIndustries NH90 began on 13 December 2006 with two helicopters to the German Army

1154752

Official Records

(Corrected to 1 January 2007)



For a second edition in succession, the Scaled Composites 311 Capricorn Virgin Atlantic GlobalFlyer heads this section, having bettered its earlier achievements during 2006, again flown by Steve Fossett (Paul Jackson)

1164937

The Fédération Aéronautique Internationale (FAI) is the world authority for verification of aviation records. Each category is further broken down by type of power plant, weight band and sex of pilot, while time-to-height and height-with-payload records are subdivided into further bands. Additionally, point-to-point records can be set between an almost unlimited number of city pairs. Consequently, only the more significant records are quoted here.

The full range of categories is:

- Class A Free balloons
- Class B Airships
- Class C Aeroplanes
- Class D Gliders and motor gliders
- Class E Rotorcraft

- Class F Aeromodelling
- Class G Parachuting
- Class H VTOL aeroplanes
- Class I Human-powered aircraft
- Class K Spacecraft
- Class M Tilting wing/engine aircraft

- Class N STOL aeroplanes
- Class O Hang gliders and paragliders
- Class P Aerospacecraft
- Class R Microlights
- Class S Space models
- Class U Unmanned Aerial Vehicles

ABSOLUTE WORLD RECORDS

CLASS A (Free Balloons)

Four records are classed as Absolute World Records for free balloons by the FAI, as follows:

Duration (Switzerland)

Bertrand Piccard (Switzerland) and Brian Jones (UK) in the Cameron R-650 combination hot air/helium balloon HB-BRA *Breitling Orbiter 3*, from Château d'Oex, Switzerland, to near Dakhla, Egypt, between 1 and 21 March 1999. 477 hours 47 minutes.

Distance (Switzerland)

Bertrand Piccard (Switzerland) and Brian Jones (UK) in the Cameron R-650 combination hot air/helium balloon HB-BRA *Breitling Orbiter 3*, from Château d'Oex, Switzerland to near Dakhla, Egypt, between 1 and 21 March 1999. 22,037.8 n miles (40,814.0 km; 25,361.34 miles).

Altitude (US)

Cdr M D Ross and Lt Cdr V A Prather in Winzen Research ONXR290WRP-1 *Lee Lewis Memorial*, from USS *Antietam*, Gulf of Mexico, on 4 May 1961. 34,668 m (113,740 ft).

Shortest time around the world (US)

Steve Fossett (USA) in Cameron/Cole R-550 combination hot air/helium balloon N277SF *Bud Light Spirit of Freedom* from Northam, Australia to meridian 116° 42' 16" East, over Australia, between 19 June and 2 July 2002. 320 hours 33 minutes.

CLASS B (Airships)



In 2006, the Avgur Au-35 bettered the airship altitude record set two years earlier by the Boland Rover

1164938

Four records are classed as Absolute World Records for airships by the FAI, as follows:

Duration (Germany)

Kapt Hugo Eckener and crew in Zeppelin D-LZ127 *Graf Zeppelin* from Lakehurst, New Jersey, to Friedrichshafen, Germany, between 29 October and 1 November 1928. 71 hours 7 minutes.

Distance in a straight line (Germany)

Kapt Hugo Eckener and crew in Zeppelin D-LZ127 *Graf Zeppelin* from Lakehurst, New Jersey, to Friedrichshafen, Germany, between 29 October and 1 November 1928. 3,447.35 n miles (6,384.50 km; 3,967.14 miles).

Altitude (Russian Federation)

Stanislav Fiodorov in Avgur Au-35 RA-0337G *Snow Goose* at Moscow, Russian Federation, 17 August 2006. 8,180 m (26,837 ft).

Speed in a straight line (UK)

Steve Fossett and Hans-Paul Ströhle in Zeppelin NT N07-100 D-LZFN at Friedrichshafen, Germany, 27 October 2004. 62.1 kt (115 km/h; 71.5 mph).

CLASS C (Aeroplanes)

Seven records are classed as Absolute World Records for aeroplanes by the FAI, as follows:

Distance without landing (US), and Distance over a closed circuit without landing

Steve Fossett in Scaled Composites 311 Capricorn Virgin Atlantic GlobalFlyer N277SF, 8 to 11 February 2006 from Salina, Kansas, to Shannon, Ireland. 22,390.67 n miles (41,467.53 km; 25,766.67 miles).

Distance over a closed circuit without landing (US)

Steve Fossett in Scaled Composites 311 Capricorn Virgin Atlantic GlobalFlyer N277SF, 14 to 17 March 2006 from and to Salina, Kansas. 21,979.77 n miles (40,706.53 km; 25,293.88 miles).

Altitude (USSR)

Alexander Fedotov in an E-266M (MiG-25) on 31 August 1977. 37,650 m (123,523 ft).

Altitude in sustained horizontal flight (US)

Captain Robert C Helt and Major Larry A Elliott, USAF, in an unidentified Lockheed SR-71A on 28 July 1976 at Beale AFB, California. 25,929.031 m (85,069 ft).

Altitude, after launch from a 'mother-plane' (US)

Major R White, USAF, in the North American X-15A-3 (56-6672) on 17 July 1962, at Edwards AFB, California. 95,935.99 m (314,750 ft).

Speed on a straight course (US)

Captain Eldon W Joersz and Major George T Morgan Jr, USAF, in an unidentified Lockheed SR-71A on 28 July 1976 over a 15/25 km course at Beale AFB, California. 1,905.81 kt (3,529.56 km/h; 2,193.17 mph).

Speed in a closed circuit (US)

Major Adolphus H Bledsoe Jr and Major John T Fuller, USAF, in Lockheed SR-71A 64-17958, on 27 July 1976, over a 1,000 km closed circuit from Beale AFB, California. 1,818.154 kt (3,367.221 km/h; 2,092.294 mph).

WORLD CLASS RECORDS

Following are details of some of the more important world class records confirmed by the FAI:

CLASS C, GROUP 1 (Landplanes with piston engines)



Mario Pezzi, in pressure suit, seated in his Caproni Ca 161bis in 1938

Distance in a straight line (US), and Distance in a closed circuit (US)

Richard 'Dick' Rutan and Jeana Yeager in the Voyager (N269VA), between 14 and 23 December 1986. Circumnavigation of the World, starting and finishing at Edwards AFB, California. 21,712.816 n miles (40,212.139 km; 24,986.664 miles).

Altitude (Italy)

Mario Pezzi, in a Caproni Ca 161bis, on 22 October 1938 at Montecelio, Italy. 17,083 m (56,046 ft).

Speed in a straight line (US)

Lyle Shelton in the modified Grumman F8F Bearcat Rare Bear (N777L), with a 2,833 kW (3,800 hp) Wright R-3350 engine, on 21 August 1989, over a 3 km course at Las Vegas, New Mexico. 459.09 kt (850.24 km/h; 528.31 mph).

CLASS C, GROUP 2 (Landplanes with turboprop engines)

Great circle distance without landing (US)

Lt Col E L Allison and crew in a Lockheed HC-130H Hercules (65-0972), on 20 February 1972. 7,587.99 n miles (14,052.95 km; 8,732.098 miles).

Distance in a closed circuit (US)

Cdr Philip R Hite and crew in the Lockheed RP-3D Orion (158227), on 4 November 1972. 5,455.46 n miles (10,103.51 km; 6,278.03 miles).

Altitude (US)

Einar Enevoldson in Grob Egrett-1, N14ES, on 1 September 1988, at Majors Field, Greenville, Texas. 16,329 m (53,573 ft).

Speed on a straight course (US)

Cdr Donald H Lilienthal and crew in a Lockheed P-3C Orion, over a 15/25 km course on 27 January 1971. 435.26 kt (806.10 km/h; 500.89 mph).

Speed in a closed circuit (USSR)

Ivan Sukhomlin and crew in Tupolev Tu-114 SSSR-76459, on 9 April 1960, carrying a 25,000 kg payload over a 5,000 km circuit. 473.66 kt (877.212 km/h; 545.07 mph).

CLASS C, GROUP 3 (Landplanes with jet engines)



The FAI has ratified the Class C-1b Group 4 (landplanes 500 to 1,000 kg; rocket engine) distance claim of 3 December 2005 by Richard G Rutan and the XCOR Aerospace EZ-Rocket (modified Rutan EZ) N132EZ for 8.64 n miles (16 km; 9.94 miles) without landing. This "shortest long-distance record flight" received the National Aeronautic Association's 2005 award for Most Memorable Aviation Record and paves the way for establishment of a Rocket Racing League

1164941

Distance without landing and distance over a closed circuit without landing (US)

See absolute World Records.

Altitude, speed on straight course and speed in 1,000 km closed circuit

See Absolute World Records.

Speed over a 3 km course at restricted altitude (US)

Darryl Greenamyer in the modified Red Baron F-104RB Starfighter (N104RB), on 24 October 1977, at Mud Lake, Tonopah, Nevada. 858.77 kt (1,590.45 km/h; 988.26 mph).

Speed in a 100 km closed circuit (USSR)

Alexander Fedotov in an unidentified Mikoyan E-266 (MiG-25) on 8 April 1973. 1,406.641 kt (2,605.1 km/h; 1,618.734 mph).

Speed in a 500 km closed circuit (USSR)

M Komarov in a Mikoyan E-266 (MiG-25), on 5 October 1967, near Moscow. 1,609.88 kt (2,981.5 km/h; 1,852.62 mph).

Speed around the world (Eastbound; without aerial refuelling) (France)

Michel Dupont and Claude Hetru in Concorde F-BTSD on 16 August 1995. 704.68 kt (1,305.93 km/h; 811.46 mph). (Note. Exceeds record for circumnavigation with aerial refuelling and speed Westbound).



Beriev Be-10 (M-10) '40' holds altitude and speed records for seaplanes, plus 10 more of lesser importance — most remaining unbeaten

1164939

Speed around the world, non-stop and non-refuelled (US)

Steve Fossett in Scaled Composites 311 Capricorn Virgin Atlantic GlobalFlyer N277SF, 1 to 3 March 2005 from and to Salina, Kansas. 297.40 kt (550.78 km/h; 342.24 mph).

Greatest payload carried to a height of 2,000 m (Ukraine)

Aleksandr V Galunenko in Antonov An-225 Mriya UR-82060, on 11 September 2001. 253,820 kg (559,577 lb).

CLASS C.2, ALL GROUPS (Seaplanes)

Great circle distance without landing (UK)

Capt D C T Bennett and First Officer I Harvey, in the Short-Mayo S.20 Mercury, G-ADHJ, between 6 and 8 October 1938, from Dundee, Scotland, to the Port Nolloth, South Africa. 5,211.66 n miles (9,652 km; 5,997.5 miles).

Altitude (USSR)

Georgi Buryanov and crew of two in Beriev M-10 '40', on 9 September 1961, over the Sea of Azov. 14,962 m (49,088 ft).

Speed on a straight course (USSR)

Nikolai Andrievsky and crew of two in Beriev M-10 '40', on 7 August 1961, at Joukovski-Petrovskoe, over a 15/25 km course. 492.44 kt (912 km/h; 566.69 mph). 'Class C.3 Amphibians record is held by Sergei Andreev and Nikolay Shlykov in Beriev M-12 Tchaika '05' on 30 October 1987. 309.54 kt (573.27 km/h; 356.21 mph).

CLASS E.1 (Helicopters)

Great circle distance without landing (US)

R G Ferry in a Hughes YOJ-6A, between 6 and 7 April 1966, from Culver City, California, to Ormond Beach, Florida. 1,923.08 n miles (3,561.55 km; 2,213 miles).

Altitude (France)

Jean Boulet in an Aerospatiale SA 315B Lama on 21 June 1972, at Istres, France. 12,442 m (40,820 ft).

Speed on a straight course (UK)

Trevor Egginton and Derek Clews in Westland Lynx G-LYNX, on 11 August 1986, over a 15/25 km course, at Glastonbury, Somerset. 216.45 kt (400.87 km/h; 249.09 mph).

Speed over a closed circuit (US)

Thomas F Doyle Jr in Sikorsky S-76A N5445J, over a 500 km circuit at West Palm Beach, Florida, on 8 February 1982. 186.68 kt (345.74 km/h; 214.83 mph).

CLASS E.3 (Autogyros)**Altitude without payload (US)**

Andrew C Keech, in Little Wing LW-5 N100MK on 26 April 2004 at Frederick, Maryland. 8,049 m (26,407 ft).

Distance without landing (US)

Andrew C Keech, in Little Wing LW-5 N100MK from Little Rock, Arkansas, to Statesville, North Carolina, on 14 February 2006, 584.72 n miles (1,082.91 km; 672.89 miles). Claim of 763 n miles (1,414 km; 879 miles) lodged by same pilot and aircraft on 3 February 2007.

Distance over a closed circuit without landing (US)

Andrew C Keech in Little Wing LW-5 N100MK at Little Rock, Arkansas, 9 February 2006, 550.26 n miles (1,019.09 km; 633.23 miles). Claim of 610 n miles (1,130 km; 702 miles) lodged by same pilot and aircraft on 31 January 2007.

Speed on a straight course (UK)

Wing Cdr K H Wallis, in a Wallis WA-121/Mc G-BAHH, over a 3 km course, at Shipdam, Norfolk, on 16 November 2002. 112.1 kt (207.7 km/h; 129.1 mph).



Autogyro records formerly held by Wg Cdr Ken Wallis are now being taken over by the Little Wing LW-5 of Andrew Keech

1154660

Quality Policy

Jane's Information Group is the world's leading unclassified information integrator for military, government and commercial organisations worldwide. To maintain this position, the Company will strive to meet and exceed customers' expectations in the design, production and fulfilment of goods and services.

Information published by Jane's is renowned for its accuracy, authority and impartiality, and the Company is committed to seeking ongoing improvement in both products and processes.

Jane's will at all times endeavour to respond directly to market demands and will also ensure that customer satisfaction is measured and employees are encouraged to question and suggest improvements to working practices.

Jane's will continue to invest in its people through training and development to meet the Investor in People standards and changing customer requirements.

www.janes.com

Jane's

Intelligence and Insight You Can Trust

International Aircraft Registration Prefixes



F-WWOW! An appropriately awesome registration for the prototype Airbus A380 (accompanied by the Red Arrows at Farnborough in 2006) was facilitated by regulations requiring 'W' to be the first variable letter of registration for uncertified aircraft in France (Paul Jackson) 1164934

Registration Requirements

An international system for the identification of civil aircraft was devised in 1919 and enshrined (with much else concerning aerial transport) in the Convention Relating to the Regulation of Air Navigation, which was signed in Paris on 13 October that year. This built upon embryo national systems, most notably that of the UK which had adopted the letter "G" as a national prefix in May 1919 following the issue, on 30 April, of what are believed to have been the world's first airworthiness and registration requirements.

Further conferences and conventions built upon this basis, the allocation of marks passing to the International Commission for Air Navigation (CINA). Today, Annex 7 of the International Civil Aviation Organisation regulations describes the application of aircraft registrations in broad terms. National prefixes have changed through the years, not only as the consequence of the birth of new countries, but for other reasons. Examples from the 1920s include CH- (for Switzerland); R- (Argentina); and UL- (Luxembourg). Lithuania, when recently returned to autonomy, was assigned LY- and not the RY- previously used.

Implementation of Annex 7 is by national governments, whose aviation authorities often have slightly different interpretations. Variations might include the wearing of Italic characters (not exceeding 30° slope) and dispensation for helicopters to carry smaller registrations. In addition, New Zealand allows seriffed, variable thickness letters similar to Helvetica typeface and the omission of the national prefix for aircraft not intending to leave the islands.

The 'regulations' which follow must be taken, therefore, as only a guide.

(A) Permanent marking of aircraft nationality and registration shall (a) have no ornamentation; (b) contrast in colour with the background; and (c) be legible.

(B) Display of Marks: Each aircraft shall display marks consisting of the Roman capital letter denoting nationality, followed by the registration letters or number of the aircraft in Arabic numerals or Roman capital letters.



All new UK sailplanes are now required to have a British civil registration, this usually coinciding with the British Gliding Association trigraph, as with this Glaser-Dirks DG-505/20 Elan 'KHC' (Paul Jackson) 1164936

(C) Size of Marks: The character marks on vertical surfaces shall be at least 30 centimetres high (25 cm on helicopters in some countries, with dispensations down to 15 cm where space is unavailable); and 50 centimetres on lighter than air craft. When required to be carried, underside registrations (port wing of aeroplanes; beneath helicopter cabins) should be 50 cm in height.

Characters shall be formed by solid lines one-sixth as thick as the character is high. Characters must be two-thirds as wide as they are high, except the number "1", which must be one-sixth as wide as it is high, and the letters "M" and "W" which may be as wide as they are high. The space between each character may not be less than one quarter of the character width.

(D) Location of marks: These shall be on either the vertical tail surfaces or the sides of the fuselage between wing and empennage. Rotorcraft shall display marks horizontally on both surfaces of the cabin, fuselage, boom, or tail.

Airship marks are to be located lengthwise on each side of the hull and on its upper surface on the line of symmetry; or on the horizontal and vertical stabilisers. For the horizontal stabiliser, located on the right half of the upper surface and on the left half of the lower surface, with the tops of the letters and numbers toward the leading edge; and for the vertical stabiliser, located on each side of the bottom half stabiliser, with the letters and numbers placed horizontally.

The following two tables list (by alphanumeric order of prefix and alphabetical order of country, respectively) the markings which identify the national registrations of civil aircraft. The tables include some *de facto* prefixes which do not conform to ICAO rules. Mongolia, for example, has standardised on JU-, replacing both MT- and BNMAU-. Not all allocated markings are in current use, examples including Gibraltar and Vatican City. Brazil used only PP- and PT- from its allocation until PR- was brought into use in April 1999. In an unprecedented move in early 2002, Liberia responded to widespread abuse of its register by uncertified aircraft carrying illegal identities and revoked all EL- registrations. The new prefix A8- was introduced in 2003. At the same time, the first use was recorded in the Russian autonomous region of Karelia of the prefix KT-, while the Russian Federation began issuing privately owned aircraft with new registrations comprising four numbers and one letter, replacing five numbers.

Letter/number prefixes were introduced in 1948, while some countries which follow the national identifier with numbers omit the hyphen. In the case of some small members of the British Commonwealth, one or two letters after the hyphen are required to complete the national identity, leaving scope for as few as 26 aircraft on the national register.

Within national authorities, rules for allocation vary considerably. Not all letters of the alphabet need be employed. Owners may be permitted to request personal suffixes outside the strict alphabetical progression of the register, or certain classes of aircraft (by weight band or number of engines, for example) might be assigned specific groups of registrations. Civil aircraft flown under permit,



Russia's Avia Register forbids use of the RA- nationality prefix before individual aircraft receive their certificate of airworthiness. This Antonov An-140 (RA-)41250 flew to Farnborough for display without satisfying the legal requirement to indicate its country of registry (Paul Jackson) 1164935

sailplanes, ultralights, microlights and aircraft undergoing manufacturer's testing are in some countries allocated registration suffixes of an entirely different character (for example, numbers instead of letters).

It should be borne in mind that what are regarded as civil aircraft registrations are but part of a worldwide system of radio call-signs. Perhaps the best known of these is the range WAA to WZZ for the United States, often quoted in reference to commercial stations; for example WWFM. Likewise, there is a gap in aircraft registrations between CN- (Morocco) and CP- (Bolivia) because COA- to COZ- are assigned to Cuban ground stations. Amateur radio stations are large scale users of the system, a typical UK call-sign being GB2ATC (compared with G-AAAA to G-ZZZZ for civil aircraft).

A peculiarity in France is that although ultralight aircraft have an internal registration system comprising the local

post code prefix plus two or three letters (for example 91-YC), those choosing to install a radio require a radio call-sign in the FJ range (such as FJPGW) which is often—although not compulsorily—applied externally in the form of a civil registration with a hyphen following the F. Similarly, some air forces apply military aircraft call-signs externally, most notably in Africa.

While new forms of flying machine have often found a home on civil aircraft registers until a special form of registration has been devised for them (air cushion vehicles, for example), UAVs have been slow to follow that convention. However 2005 was notable for the appearance on the US, Austrian and Italian registers of unmanned aircraft, with the promise of more to come.

More rapid expansion of the UK civil register is taking place in 2006 because of a change of regulations, retrospectively effective from 28 September 2003, requiring

new sailplanes to adopt regular markings in place of the system administered by the British Gliding Association (BGA). All sailplanes imported into the UK after that date are being registered, preference being given to incorporation of the three letters of the trigraph previously allocated by the BGA.

The first such known is Schempp-Hirth Ventus 2CT BGA5071 'KGB' registered on 8 September 2003 (but not flown in the UK until after the 28 September deadline) and transferred to the civil register as G-CKGB on 3 January 2006. The G-CK** series will be used except where registrations have already been assigned to powered machines, in which case the final three letters will receive a non-conflicting prefix, such as G-D** or G-E**. Sailplanes registered with the BGA before September 2003 have a permanent exemption and out-of-sequence registrations are permitted on payment of the usual fee.

Registration prefixes: by prefix

AP- Pakistan
A2- Botswana
A3- Tonga
A4O- Oman
A5- Bhutan
A6- United Arab Emirates
A7- Qatar
A8- Liberia
A9C- Bahrain
B- China
B-H Hong Kong
B-M Macao
B- Taiwan
C-, CF- Canada
CC- Chile
CN- Morocco
CP- Bolivia
CR-, CS- Portugal
CU- Cuba
CX- Uruguay
C2- Nauru
C3- Andorra
C5- Gambia
C6- Bahamas
C9- Mozambique
D- Germany
DQ- Fiji
D2- Angola
D4- Cape Verde
D6- Comoros
EC- Spain
EI-, EJ- Ireland
EK- Armenia
EL- revoked 2002 (was Liberia)
EP- Iran
ER- Moldova
ES- Estonia
ET- Ethiopia
EW- Belarus
EX- Kyrgyzstan
EY- Tajikistan
EZ- Turkmenistan
E3- Eritrea
E5- Cook Islands
F- France and colonies
G- United Kingdom
HA- Hungary
HB- Switzerland & Liechtenstein
HC- Ecuador
HE- Greece (ultralights)
HH- Haiti
HI- Dominican Republic
HK- Colombia
HL- Korea, South
HP- Panama
HR- Honduras
HS- Thailand
HV- Vatican City
HZ- Saudi Arabia
H4- Solomon Islands
I- Italy
JA- Japan
JU- Mongolia
JY- Jordan
J2- Djibouti
J3- Grenada
J5- Guinea-Bissau
J6- St Lucia
J7- Dominica
J8- St Vincent & Grenadines

LN- Norway
LQ-, LV- Argentina
LX- Luxembourg
LY- Lithuania
LZ- Bulgaria
N- USA
OB- Peru
OD- Lebanon
OE- Austria
OH- Finland
OK- Czech Republic
OM- Slovak Republic
OO-, OQ- Belgium
OY- Denmark
P- Korea, North
PH- Netherlands
PJ- Netherlands Antilles
PK- Indonesia
PP- to PU- Brazil
PZ- Suriname
P2- Papua New Guinea
P4- Aruba
RA-, RF- Russia
RDPL- Laos
RP- Philippines
SE- Sweden
SP- Poland
ST- Sudan
SU- Egypt
SU-YA Palestine
SX- Greece
S2- Bangladesh
S5- Slovenia
S7- Seychelles
S9- São Tomé e Príncipe
TC- Turkey
TF- Iceland
TG- Guatemala
TI- Costa Rica
TJ- Cameroon
TL- Central African Republic
TN- Congo (Republic)
TR- Gabon
TS- Tunisia
TT- Chad
TU- Côte d'Ivoire
TY- Benin
TZ- Mali
T2- Tuvalu
T3- Kiribati
T7- San Marino
T8A- Palau
T9- Bosnia-Herzegovina
UK- Uzbekistan
UN- Kazakhstan
UR- Ukraine
VH- Australia
VN- Vietnam
VP-A Anguilla
VP-B Bermuda
VP-C Cayman Islands
VP-F Falkland Islands
VP-G Gibraltar
VP-I Isle of Man
VP-LM Montserrat
VP-LV British Virgin Islands
VQ-H St Helena & Ascension
VQ-T Turks & Caicos Islands
VT- India
V2- Antigua & Barbuda

V3- Belize
V4- St Kitts & Nevis
V5- Namibia
V6- Micronesia
V7- Marshall Islands
V8- Brunei
XA- to XC- Mexico
XT- Burkina Faso
XU- Cambodia
XY-, XZ- Myanmar
YA- Afghanistan
YI- Iraq
YJ- Vanuatu
YK- Syria
YL- Latvia
YN- Nicaragua
YR- Romania
YS- El Salvador
YU- Yugoslavia
YV- Venezuela
Z- Zimbabwe
ZA- Albania
ZK- to ZM- New Zealand
ZP- Paraguay
ZS- to ZU- South Africa
Z3- Macedonia
3A- Monaco
3B- Mauritius
3C- Equatorial Guinea
3D- Swaziland
3X- Guinea
4K- Azerbaijan
4L- Georgia
4R- Sri Lanka
4X- Israel
5A- Libya
5B- Cyprus
5H- Tanzania
5N- Nigeria
5R- Madagascar
5T- Mauritania
5U- Niger
5V- Togo
5W- Samoa
5X- Uganda
5Y- Kenya
60- Somalia
6V-, 6W- Senegal
6Y- Jamaica
70- Yemen
7P- Lesotho
7Q- Malawi
7T- Algeria
8P- Barbados
8Q- Maldives
8R- Guyana
9A- Croatia
9G- Ghana
9H- Malta
9J- Zambia
9K- Kuwait
9L- Sierra Leone
9M- Malaysia
9N- Nepal
9Q- Congo (Democratic Republic)
9U- Burundi
9V- Singapore
9XR- Rwanda
9Y- Trinidad & Tobago

INTERNATIONAL AIRCRAFT REGISTRATION PREFIXES

Registration prefixes: by country

Afghanistan	YA-	Germany	D-	Oman	A4O-
Albania	ZA-	Ghana	9G-	Pakistan	AP-
Algeria	7T-	Gibraltar	VP-G	Palau	T8A-
Andorra	C3-	Greece	SX-	Palestine	SU-YA
Angola	D2-	(ultralights)	HE-	Panama	HP-
Anguilla	VP-LA	Grenada	J3-	Papua New Guinea	P2-
Antigua & Barbuda	V2-	Guatemala	TG-	Paraguay	ZP-
Argentina	LQ-, LV-	Guinea	3X-	Peru	OB-
Armenia	EK-	Guinea-Bissau	J5-	Philippines	RP-
Aruba	P4-	Guyana	8R-	Poland	SP-
Australia	VH-	Haiti	HH-	Portugal	CR-, CS-
Austria	OE-	Honduras	HR-	Qatar	A7-
Azerbaijan	4K-	Hungary	HA-	Romania	YR-
Bahamas	C6-	Iceland	TF-	Russian Federation	RA-, RF-
Bahrain	A9C-	India	VT-	Rwanda	9XR-
Bangladesh	S2-	Indonesia	PK-	El Salvador	YS-
Barbados	8P-	Iran	EP-	Samoa	5W-
Belarus	EW-	Iraq	YI-	San Marino	T7-
Belgium	OO-, OQ-	Ireland	EI-, EJ-	São Tomé ePríncipe	S9-
Belize	V3-	Isle of Man	VP-I	Saudi Arabia	HZ-
Benin	TY-	Israel	4X-	Senegal	6V-, 6W-
Bermuda	VP-B	Italy	I-	Seychelles	S7-
Bhutan	A5-	Jamaica	6Y-	Sierra Leone	9L-
Bolivia	CP-	Japan	JA	Singapore	9V-
Bosnia-Herzegovina	T9-	Jordan	JY-	Slovak Republic	OM-
Botswana	A2-	Kazakhstan	UN-	Slovenia	S5-
Brazil	PP- to PU-	Kenya	5Y-	Solomon Islands	H4-
Brunei	V8-	Kiribati	T3-	Somalia	6O-
Bulgaria	LZ-	Korea, North	P-	South Africa	ZS- to ZU-
Burkina Faso	XT-	Korea, South	HL-	Spain	EC-
Burundi	9U-	Kuwait	9K-	Sri Lanka	4R-
Cambodia	XU-	Kyrgyzstan	EX-	St Helena & Ascension	VQ-H
Cameroon	TJ-	Laos	RDPL-	St Kitts & Nevis	V4-
Canada	C-, CF-	Latvia	YL-	St Lucia	J6-
Cape Verde	D4-	Lebanon	OD-	St Vincent & Grenadines	J8-
Cayman Islands	VP-C	Lesotho	7P-	Sudan	ST-
Central African Republic	TL-	Liberia	A8-	Suriname	PZ-
Chad	TT-	Libya	5A-	Swaziland	3D-
Chile	CC-	Liechtenstein	HB-	Sweden	SE-
China	B-	Lithuania	LY-	Switzerland	HB-
(Hong Kong	B-H)	Luxembourg	LX-	Syria	YK-
(Macao	B-M)	Macedonia	Z3-	Taiwan	B-
Colombia	HK-	Madagascar	5R-	Tajikistan	EY-
Comoros	D6-	Malawi	7Q-	Tanzania	5H-
Congo (Democratic Republic)	9Q-	Malaysia	9M-	Thailand	HS-
Congo (Republic)	TN-	Maldives	8Q-	Togo	5V-
Cook Islands	E5-	Mali	TZ-	Tonga	A3-
Costa Rica	TI-	Malta	9H-	Trinidad & Tobago	9Y-
Côte d'Ivoire	TU-	Marshall Islands	V7-	Tunisia	TS-
Croatia	9A-	Mauritania	5T-	Turkey	TC-
Cuba	CU-	Mauritius	3B-	Turkmenistan	EZ-
Cyprus	5B-	Mexico	XA- to XC-	Turks & Caicos	VQ-T
Czech Republic	OK-	Micronesia	V6-	Tuvalu	T2-
Denmark	OY-	Moldova	ER-	Uganda	5X-
Djibouti	J2-	Monaco	3A-	Ukraine	UR-
Dominica	J7-	Mongolia	JU-	United Arab Emirates	A6-
Dominican Republic	HI-	Montserrat	VP-LM	United Kingdom	G-
Ecuador	HC-	Morocco	CN-	United States	N
Egypt	SU-	Mozambique	C9-	Uruguay	CX-
Equatorial Guinea	3C-	Myanmar	XY-, XZ-	Uzbekistan	UK-
Eritrea	E3-	Namibia	V5-	Vanuatu	YJ-
Estonia	ES-	Nauru	C2-	Vatican City	HV-
Ethiopia	ET-	Nepal	9N-	Venezuela	YV-
Falkland Islands	VP-F	Netherlands	PH-	Vietnam	VN-
Fiji	DQ-	Netherlands Antilles	PJ-	Virgin Islands	VP-L
Finland	OH-	New Zealand	ZK- to ZM-	Yemen	7O-
France and colonies	F-	Nicaragua	YN-	Yugoslavia	YU-
Gabon	TR-	Niger	5U-	Zambia	9J-
Gambia	C5-	Nigeria	5N-	Zimbabwe	Z-
Georgia	4L-	Norway	LN-		

United Kingdom 'B Conditions' Markings

Many countries' registration systems include provision for aircraft undergoing special testing, or being prepared for export, to have temporary markings in a reserved area of the register. In the UK, the system takes the form of the national identifying letter (G-) followed by a number to indicate the authorised manufacturer or modification centre, followed by an individual number, usually beginning at one (for example G-90-2). The last-mentioned numbers were frequently re-used, but reallocation is now rare. Authorised users had reached 94 by 2006, current users being included in the CAA's CAP 475 listing of approved organisations.

In recent years, aircraft capable of carrying armament, which would have used B Conditions, have been required to carry a military serial number issued by the Ministry of Defence in the normal sequence of allocations.

Markings currently authorised (although not necessarily used on a regular basis) are detailed in the following table. These are not 'registrations' in the strict sense of the term, as there is no central record of allocations.

G-08	BAE Systems (Prestwick)	G-68	Medway Microlights	G-89	Cosmik Aviation
G-17	AgustaWestland	G-71	FR Aviation	G-90	Aerosport
G-36	Cranfield Aerospace	G-76	Police Aviation Services	G-94	RotorSport*
G-51	Britten-Norman Aircraft	G-77	Thruster Air Services		
G-52	Marshall Aerospace	G-78	Bristow Helicopters		
G-61	Aviation Enterprises	G-79	McAlpine Helicopters		
G-67	Tenencia	G-80	British Microlight Aircraft Association		

* Rotorsport's authority had lapsed by December 2006

Glossary of Aerospace Terms in Jane's All the World's Aircraft



Chord: distance between leading and trailing edges, demonstrated by the Supermarine Spitfire LF Mk XVI's elliptical wing (Paul Jackson)

1164925

AAM Air-to-air missile.
AAR Air-to-air refuelling.
AB Aktiebolag (Swedish company constitution).
absolute ceiling Greatest altitude attainable by aircraft in level flight. Compare service ceiling and certified altitude.
AC Alternating current.
ACC Air Combat Command (US).
ACLS Automatic carrier landing system.
ACMI Air combat manoeuvring instrumentation.
ACN Aircraft classification number (ICAO system for aircraft pavements).
ADC Air data computer.
ADF Medium-frequency automatic direction-finding (equipment).
ADI Attitude/director indicator.
aerofoil (N America, airfoil) Any solid body so shaped that, as a fluid medium (air or hot gas) moves past it, it experiences a useful force perpendicular to the direction of relative motion; thus, a wing generates lift, while a turbine blade generates torque on a shaft.
aeroplane (N America, airplane) Heavier-than-air aircraft with propulsion and a wing that does not rotate in order to generate lift.
AEW Airborne early warning.
AFB Air Force Base (USAF).
AFCs Automatic flight control system.
AFRP Aramid fibre-reinforced plastics.
afterburning Temporarily augmenting the thrust of a turbofan or turbojet by burning additional fuel in the jetpipe.
AGM Air-to-ground missile.
Ah Ampère-hours.
AHRS Attitude/heading reference system.
airbrake Passive device extended from aircraft to increase drag. Most common form is hinged flap(s) or plate(s), mounted in locations where operation causes no significant deterioration in stability and control at any attainable airspeed.
aircraft All manmade vehicles for off-surface navigation within the atmosphere, including helicopters and balloons. For practical purposes, air-cushion vehicles and wing-in-ground-effect vehicles are excluded from the classification.
airship Power-driven lighter-than-air aircraft. Traditional classes are: blimp, a small non-rigid; non-rigid, in which envelope is essentially devoid of rigid members and maintains shape by inflation pressure; semi-rigid, non-rigid with strong axial keel acting as beam to support load; and rigid, in which envelope is itself stiff in local bending or supported within or around rigid framework.
airstair Retractable stairway built into aircraft.
ALARM Air-launched anti-radiation missile.
ALCM Air-launched cruise missile.

Allithium Aluminium-lithium alloy.
ALLTV All-light level television.
AM Amplitude modulation.
AMC Air Mobility Command (US).
amphibian Aerodyne capable of routinely operating from land or water, whether flying boat or floatplane.
AMRAAM Advanced Medium-Range AAM.
ANG Air National Guard (US).
anhedral Downward slope of wing or tailplane from root to tip.
anti-balance tab Hinged surface on trailing-edge of stabilator and operating in same direction, so as to dampen its movement.
ANVIS Aviator's night vision system.
AO Aktsionernoye Obschestvo (Co Ltd; Russian company constitution).
AoA Angle of attack (see 'attack' below).
AOOT Aktsionernoye Obschestvo Okrytogo Tipa (Russian company constitution).
approach noise Measured 1 n mile from downwind end of runway with aircraft passing overhead at 113 m (370 ft).
APR Auxiliary power reserve.
APU Auxiliary power unit (part of aircraft).
ARINC Aeronautical Radio Inc, US company whose electronic box sizes (racking sizes) are the international standard.
ARM Anti-radiation missile.
ARNG Army National Guard (US).
ASE (1) Automatic stabilisation equipment; (2) Aircraft survivability equipment.
ASI Airspeed indicator.
ASM Air-to-surface missile.
aspect ratio Measure of wing (or other aerofoil) slenderness seen in plan view, usually defined as the square of the span divided by gross area.
AST Air Staff Target (UK).
ASTOVL Advanced STOVL.
ASUW Anti-surface unit warfare.
ASV Anti-surface vessel.
ASW Anti-submarine warfare.
ATC Air traffic control.
ATR Airline Transport Radio ARINC 404 black box racking standards.
attack, angle of (alpha) Angle at which airstream meets aerofoil (angle between mean chord and free-stream direction). Not to be confused with angle of incidence (which see).
augmented Boosted by afterburning (turbofan).
autogyro Rotary-wing aircraft propelled by a propeller (or other thrusting device) and lifted by a freely running autorotating rotor. Compare gyroplane.
AUW All-up weight (term meaning total weight of aircraft under defined conditions, or at a specific time during flight). Not to be confused with MTOW (which see).

avionics Aviation electronics.
AWACS Airborne warning and control system (aircraft category).
axisymmetric intakes Twin, circular engine air intakes mounted astride the spinner of New Piper light aircraft.
axisymmetric nozzle Circular jet-engine nozzle capable of unrestricted vectoring movement (within a cone specified by mechanical limitation) to enhance aircraft manoeuvrability.
ballistic parachute Emergency recovery parachute installed in (generally light) aircraft and capable of supporting both machine and occupants.
band See radar frequency.
bar Non-SI unit of pressure adopted by this yearbook pending wider acceptance of Pa. 1 bar = 10^5 Pa. ISA pressure at S/L is 1013.2 mb or just over 1 bar. ICAO has standardised hectopascal for atmospheric pressure, in which ISA S/L pressure is 101.32 hPa.
basic operating weight MTOW minus payload (thus, including crew, fuel and oil, bar stocks, cutlery and so on).
bearingless rotor Rotor in which flapping, lead/lag and pitch change movements are provided by the flexibility of the structural material and not by bearings. No rotor is truly rigid.
BITE Built-in test equipment.
bladder tank Fuel (or other fluid) tank of flexible material.
BLC Boundary-layer control.
bleed air Hot high-pressure air extracted from gas turbine engine compressor or combustor and taken through valves and pipes to perform useful work such as pressurisation, driving machinery or anti-icing by heating surfaces.
blown flap Flap across which bleed air is discharged at high (often supersonic) speed to prevent flow breakaway.
BOW Basic operating weight (which see).
BPR Bypass ratio.
BTU Non-SI energy unit (British Thermal Unit) = 0.9478 J.
bulk cargo All cargo not packed in containers or on pallets.
bus Busbar, main terminal in electrical system to which battery or generator power is supplied.
BV Besloten Vennootschap (Netherlands company constitution).
BVR Beyond visual range.
BWB Blended wing/body.
bypass ratio Air flow through fan duct (not passing through core) divided by airflow through core.
byte Group of bits of information forming unit in computer processing.
C^A Command, control and communications.
CAA Civil Aviation Authority (UK).

cabane Structure, usually of braced struts, to support load above fuselage or wing. May carry parasol wing, engine nacelle or upper wing of most biplanes.

cabin altitude Height above S/L at which ambient pressure is same as inside cabin.

CAD/CAM Computer-assisted design/computer-assisted manufacture.

CAHI Central Aero and Hydrodynamics Institute of the Russian Federation; also transliterated as TsAGI.

canards Foreplanes, fixed or controllable aerodynamic surfaces ahead of CG.

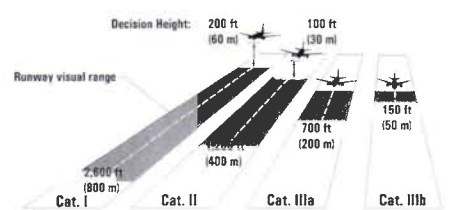
capacity The volume swept out on each stroke by the pistons of a piston engine. It is expressed in cc (cubic centimetres) for small engines and in litres (1 litre = 1,000 cc) for larger ones. Also known as displacement or swept volume.

carangifoil Profile resembling a symmetrical, streamlined, fast-swimming fish (aerostats).

carbon fibre Fine filament of carbon/graphite used as strength element in composites.

CAS (1) Calibrated airspeed, ASI calibrated to allow for air compressibility according to ISA S/L; (2) close air support.

casevac Casualty evacuation.



Categories of ILS minima

0131472

Cat Category. Meanings include runway visibility and decision height minima for ILS. See diagram.

CATIA Computer-aided three-dimensional interactive analysis; Anglicised form of French CAD proprietary system (*Conception assistée tridimensionnelle interactive d'applications*).

CBU Cluster bomb unit.

CEAM Centre d'Expériences Aériennes Militaires.

CEAT Centre d'Essais Aéronautiques de Toulouse.

Ceconite Manmade covering material for light aircraft; trade name.

CEO Chief executive officer.

certified altitude Maximum flight altitude permitted by an aircraft's type certificate. Compare service ceiling and absolute ceiling.

CEV Centre d'Essais en Vol.

CFE Conventional Forces in Europe.

CFRP Carbon fibre-reinforced plastics.

CG Centre of gravity.

chaff Thin slivers of radar-reflective material cut to length appropriate to wavelengths of hostile radars and scattered in bundles to protect friendly aircraft.

chord Distance from leading-edge to trailing-edge measured parallel to longitudinal axis.

CIS Commonwealth of Independent [ex-USSR] States. See also RFAS.

CKD Component knocked down, for assembly elsewhere.

clean (1) In flight configuration with landing gear, flaps, slats and so on retracted; (2) Without any optional external stores.



Beechcraft manufacturer's plate including c/n

1164926

c/n Constructor's number; manufacturer's serial number.

C of A Certificate of Airworthiness; awarded to each individual aircraft (compare Type Certificate).

COIN Counter-insurgency.

collective pitch Controls pitch of all blades of helicopter main rotor in unison.

combi Civil aircraft carrying both freight and passengers on main deck.

comint Communications intelligence.

composite Material made of two constituents, such as filaments or short whiskers plus adhesive forming binding matrix.

constant-speed Variable-pitch propeller governed by a CSU so that its rotational speed is held constant.

contrarotating Propellers on same axis turning in opposite directions (compare C/R).

conventional and manual Aeroplane manoeuvring surfaces mechanically linked to pilot's hand and foot controls, unassisted (except, optionally, by aerodynamic or mass balances) and comprising ailerons on the outboard wing, rudder(s) to the rear of fixed tailfin(s) and elevators to the rear of a fixed (but optionally, incidence angle trimmable) tailplane. The description optionally includes leading-edge slats, flaps on inboard trailing-edges and trim tabs, all of which are mentioned separately, if installed. Ailerons which droop in unison with flaps (and thus are not the primary means of lowering stalling speed) are regarded as conventional. Control systems not conforming to the above — in that they have foreplanes, one or more all-moving tail surfaces, or flaperons, and those with mechanical/electronic assistance or interception of the pilot's movements — are described in appropriate detail.

convertible Transport aircraft able to be equipped to carry passengers or cargo, but not both simultaneously.

COO Chief operating officer.

core Gas generator portion of turbofan comprising compressor(s), combustion chamber and turbine(s).

C/R Counter-rotating; propellers of multi-engined aircraft turning in opposite directions on different axes (compare contrarotating).

CRT Cathode-ray tube.

cruising speed Flight speed on less than full engine power; maximum is normally at 75%, if not otherwise specified, but some manufacturers use higher throttle settings.

CSAS Command and stability augmentation system (part of AFCS).

CTOL Conventional take-off and landing (compare V/STOL).

CV *Cheval vapeur* (Germany, ps; *pferdestärke*) metric horsepower, equivalent to 0.7355 kW or 0.98632 hp and often translated erroneously as 'hp'.

CVR Cockpit voice recorder.

CY Calendar year; 1 January to 31 December. Compare FY.

cyclic pitch Controls variation of pitch as helicopter rotor blade makes each revolution.

Dacron Artificial fabric for light aircraft covering; trade name.

DADC Digital air data computer.

DADS Digital air data system.

DARPA Defense Advanced Research Projects Agency (US) (briefly ARPA before February 1996).

databus Electronic highway for passing digital data between aircraft sensors and system processors, usually MIL-STD-1553B or ARINC 419 (one-way) and 619 (two-way) systems.

dB Decibel.

DC Direct current.

DECU Digital engine (or electronic) control unit.

dem/val Demonstration/validation.

derated Engine restricted to power less than potential maximum (usually such engine is flat rated, which see).

design weight Different authorities have different definitions; weight chosen as typical of mission but usually much less than MTOW.

DF Direction-finder, or direction-finding.

DGAC Direction Générale à l'Aviation Civile, French certification authority.

dihedral Upward slope of wing from root (or intermediate point) to tip.

disposable load Sum of masses that can be loaded or unloaded, including payload, crew, removable equipment, usable fuel and other consumables; MTOW minus OWE.

DME UHF distance-measuring equipment; gives slant distance to a beacon; DME element of Tacan.

DoD Department of Defense.

dog-tooth A sharp discontinuity in the leading-edge of a wing or tail surface resulting from an increase in chord (see also sawtooth).

Doppler Short for Doppler radar — radar using fact that received frequency is a function of relative velocity between transmitter or reflecting surface and receiver; used for measuring speed over ground or for detecting aircraft or moving vehicles against static ground or sea.

double-slotted flap One having an auxiliary aerofoil ahead of main surface to increase maximum lift.

EAA Experimental Aircraft Association (divided into local branches called Chapters).

EAS Equivalent airspeed, RAS minus correction for compressibility.

EASA European Aviation Safety Agency.

ECCM Electronic counter-countermeasures.

ECM Electronic countermeasures.

ECS Environmental control system.

EEZ Economic exclusion (or exclusive-economic) zone.

EFIS Electronic flight instrument(ation) system, in which large multifunction CRT displays replace traditional instruments.

EGPWS Enhanced ground proximity warning system.

EGT Exhaust gas temperature.

ehp Equivalent horsepower, measure of propulsive power of turboprop made up of shp plus addition due to residual thrust from jet.

EICAS Engine indication (and) crew alerting system.

ekW Equivalent kilowatts, SI measure of propulsive power of turboprop (see ehp).

elevon Wing trailing-edge control surface combining functions of aileron and elevator.

elint electronic intelligence.

ELT Emergency locator transmitter, to help rescuers home on to a disabled or crashed aircraft.

EMD Engineering and manufacturing development.

EO Electro-optical.

EPNdB Effective perceived noise decibel, SI unit of EPNL.

ERU Ejector release unit.

ESM (1) Electronic surveillance (or support) measures; (2) Electronic signal monitoring.

ETOPS Extended-range twin (engine) operations (thus sometimes given as EROPS), routing not more than a given flight time (120, 180 or 240 minutes) from a usable alternative airfield.

EW Electronic warfare.

FAA Federal Aviation Administration.

FAC Forward air control (or controller).

factored Multiplied by an agreed number to take account of extreme adverse conditions, errors, design deficiencies or other inaccuracies.

FADEC Full-authority digital engine (or electronic) control.

FAI Fédération Aéronautique Internationale.

fail-operational System which continues to function after any single fault has occurred.

fail-safe Structure or system which survives failure (in case of system, may no longer function normally).

FAR Federal Aviation Regulations.

FAR Pt 23 Defines the airworthiness of private and air taxi aeroplanes of 5,670 kg (12,500 lb) MTOW and below.

FAR Pt 25 Defines the airworthiness of public transport aeroplanes exceeding 5,670 kg (12,500 lb) MTOW.

FBL Fly-by-light (which see).

FBW Fly-by-wire (which see).

FCS Flight control system.

FDR Flight data recorder (which see).

FDS Flight director system.

feathering Setting propeller blades at pitch aligned with slipstream to minimise drag.

fence A chordwise projection on the surface of a wing, used to modify the distribution of pressure.

Fenestron Helicopter tail rotor with many slender blades rotating in short duct (registered name).

ferry range Extreme safe range with zero payload.

FFAR Folding-fin (or free-flight) aircraft rocket.

field length Measure of distance needed to land and/or take off; many different measures for particular purposes, each precisely defined.

fixed-pitch Propeller with blades fixed to the hub.

FL Flight level. Notional altitude for air traffic control purposes which assumes ISA pressure (1013.25 mb; 29.92 in Hg) at S/L. Expressed in hundreds of feet; thus FL255 indicates approximately 25,500 ft.

flap A surface carried on the leading- or trailing-edge of a wing and able to move relative to it. The simplest leading-edge flap and so-called plain (trailing-edge) flap is formed by hinging the entire edge of the wing. The Krueger is a leading-edge flap forming part of the wing undersurface, swung down and forwards on arms to give a bluff leading-edge. A split flap is formed by hinging only the undersurface of the trailing-edge. A slotted flap is a hinged trailing-edge which moves aft as well as down on tracks to leave a narrow slot ahead of it; hence double- and triple-slotted. A Fowler flap is a complete auxiliary aerofoil mounted on tracks under a fixed trailing-edge; initially it moves aft, to emerge behind the fixed part of the wing, and at the end of its travel it rotates down. A Gouge flap has an upper surface forming part of a cylinder, and rotates (on rails or brackets) about that cylinder's centre.

flaperon Wing trailing-edge surface combining functions of flap and aileron.

FLAR Federatsii Lyubitelei Aviatsii Rossii, Russian PFA.

flat-four Piston engine having four horizontally opposed cylinders; thus, flat-twin, flat-six and so on.

flight-adjustable pitch Propeller with blades that can be changed in pitch during flight to a limited extent (eg one way only). Compare variable pitch.

flat rated Propulsion engine capable of giving full thrust or power for take-off at an airfield well above S/L and/or at high ambient temperature (thus, probably derated at S/L).

flight data recorder Crash-protected recorder of dynamic/static pressure, air temperature, control-surface

and slat/flap positions, 3-axis accelerations, engine parameters and possibly other variables.

FLIR Forward-looking infra-red.

floatplane Aeroplane with one or more floats in place of land wheels, although, optionally, with retractable wheels as part of floats. Compare flying boat and seaplane.

fly-by-light Flight control system in which signals pass between computers and actuators along fibre-optic leads.

fly-by-wire Flight control system with electrical signalling, without mechanical interconnection between cockpit flying controls and control surfaces.



Flying boat: Lake Renegade (Paul Jackson)

1164927

flying boat Aircraft whose main body is a hull with planning bottom. Compare floatplane and seaplane.

FM Frequency modulation.

FMS (1) Foreign military sales (US DoD); (2) Flight management system.

footprint (1) A precisely delineated boundary on the surface around an airfield, inside which the perceived noise of an aircraft exceeds a specified level during take-off and/or landing; (2) Dispersion of weapon or submunition impact points.

foreplanes Pivoted canard surfaces forming part of the primary flight control system with authority in pitch and possibly also in roll. See also canards.

FOV Field of view.

Fowler flap See flap.

frequency See radar frequency.

frequency agile (frequency hopping) Making a transmission harder to detect by switching automatically to a succession of frequencies.

FSD Full-scale development.

FSED Full-scale engineering development.

FY Fiscal year; in US government affairs, runs from 1 October to 30 September (FY08 begins 1 October 2007); in Japan, from 1 April (FY19 or FY07 began 1 April 2007).

g Acceleration due to mean Earth gravity, that is of a body in free-fall; or acceleration due to rapid change of direction of flight path.

gallons Non-SI measure; 1 Imp gallon (UK) = 4.546 litres, 1 US gallon = 3.785 litres.

GFRP Glass fibre-reinforced plastics.

'glass cockpit' Cockpit in which dial instruments are replaced by multifunction electronic displays.

glass fibre Spun molten glass; see GFRP.

glideslope Element giving vertical (height) guidance in ILS.

glove (1) Fixed portion of wing inboard of variable sweep wing; (2) additional aerofoil profile added around normal wing for test purposes.

GmbH Gesellschaft mit beschränkter Haftung (or Haftung) (German company constitution).

GPS Global Positioning System. US military/civil satellite-based precision navaid.

GPSS GPS Steering; integration of GPS with aircraft's autopilot to provide active navigation and smoother course changes.

GPU Ground power unit (not part of aircraft).

GPWS Ground-proximity warning system.

green aircraft Aircraft flyable but unpainted, unfurnished and basically equipped.

gross wing area See wing area.

ground-adjustable pitch Propeller with blades that can be adjusted in pitch by an engineer on the ground. Compare flight adjustable and variable pitch.

GS See glideslope.

gunship Aircraft designed for battlefield attack; helicopter gunships normally with slim body carrying pilot and weapon operator only.

GUP Gosudarstvennoye Unitarnoye Predpriyatie (Russian State Unitary Enterprise).

gyroplane Alternative term for autogyro favoured by some certification authorities, including FAA.

h Hour(s).

handed Rotating in opposite directions.

hardened Protected as far as possible against nuclear explosion.

hardpoint Reinforced part of aircraft to which external load can be attached, for example weapon or tank pylon.

HDU Hose-drum unit.

head-down display On the cockpit instrument panel (as distinct from a HUD).

head-level display Immediately below HUD.

helicopter Rotary-wing aircraft both lifted and propelled by one or more power-driven rotors turning about substantially vertical axes.

HF High frequency.

HIFR Helicopter in-flight refuelling.

HIRF High-intensity radiated field(s).

HMD Helmet-mounted display; hence HMS = sight.

HOCAC Hands on cyclic and collective.

homebuilt Aircraft built/assembled from plans or kits.

hot-and-high Adverse combination of airfield height and high ambient temperature, which lengthens required take-off distance.

HOTAS Hands on throttle and stick.

hot refuelling Replenishment of fuel while engine(s) running.

hovering ceiling Ceiling of helicopter (corresponding to air density at which maximum rate of climb is zero), either IGE or OGE.

HP High pressure (HPC, compressor; HPT, turbine).

hp Horsepower, non-SI unit of power. Compare cv.

HSI Horizontal situation indicator.

HUD Head-up display (bright numbers and symbols projected on pilot's aiming sight glass and focused on infinity so that pilot can simultaneously read display and look ahead). The term is increasingly rendered in the USA as 'heads up', which is incorrect.

Hz Hertz; cycles per second.

IAS Indicated airspeed, airspeed indicator reading corrected for instrument error.

IATA International Air Transport Association.

ICAO International Civil Aviation Organisation.

IFF Identification friend or foe.

IFR (1) Instrument flight rules (compare VFR); (2) in-flight refuelling.

IGE In ground effect; helicopter performance with theoretical flat horizontal surface just below it (for example mountain).

IR Imaging infra-red.

ILS Instrument landing system. See Cat.

Imperial gallon 1.20095 US gallons; 4.546 litres.

INAS Integrated nav/attack system.

Inc Incorporated (company constitution).

incidence The angle at which the wing is set in relation to the fore/aft axis. Often wrongly used to mean angle of attack (which see).

inertial navigation Measuring all accelerations imparted to a vehicle and, by integrating these with respect to time, calculating speed at every instant (in all three planes) and, by integrating a second time, calculating total change of position in relation to starting point.

INS Inertial navigation system.

integral construction Machined from solid instead of assembled from separate parts.

integral tank Fuel (or other liquid) tank formed by sealing part of structure.

intercom Wired telephone system for communication within aircraft.

inverter Electric or electronic device for inverting (reversing polarity of) alternate waves in AC power to produce DC.

IOC Initial operational capability.

IR Infra-red.



Nemesis IRCM

1164933

IRCM Infra-red countermeasures.

IRLS Infra-red linescan (builds TV-type picture showing cool and hot regions as contrasting shades).

IRS Inertial reference system.

IRST Infra-red search and track.

ISA International Standard Atmosphere (1013.25 mb, 1.225 g/m³ and 15 °C at mean sea level; lapse rate 1.98 °C per 1,000 ft up to -56.5 °C at 36,090 ft).

JAA Joint Aviation Authorities. Replaced by EASA.

JAR Joint Aviation Requirements, agreed by all major EC countries (JAR 25 equivalent to FAR Pt 25).

JAR-VLA JAR classification for Very Light Aircraft (MTOW limit of 750 kg; 1.653 lb).

JASDF Japan Air Self-Defence Force.

JATO Jet-assisted take-off (actually means rocket-assisted).

JCAB Japan Civil Airworthiness Board.

JDA Japan Defence Agency.

JGSDF Japan Ground Self-Defence Force.

JMSA Japan Maritime Safety Agency.

JMSDF Japan Maritime Self-Defence Force.

joined wing Tandem wing layout in which forward and aft wings are swept so that the outer sections meet.

JPATS Joint Primary Aircraft Training System (Beech T-6A Texan II).

JSC Joint stock company.

JSF Joint Strike Fighter.

JTIDS Joint Tactical Information Distribution System (NATO Link 16).

Junkers aileron Control surface (sometimes flap) suspended from mountings to the rear of wing trailing edge.

kbit One thousand bits of memory.

Kevlar Aramid fibre used as basis of high-strength composites material.

kg Kilogramme (2.20462 lb).

kitbuilt Prefabricated aircraft for amateur assembly.

KK Kabushiki Kaisha (Japanese company constitution).

km/h Kilometres per hour.

kN KiloNewtons (N×10³). See N.

knot 1 n mile per hour (1.852 km/h; 1.15078 mph).

Krueger flap Hinges down and then forward from below the leading-edge.

kVA Kilovolt-amperes.

kW Kilowatt, SI measure of all forms of power (not just electrical).

LAMPS Light airborne multipurpose system.

LANTIRN Low-altitude navigation and targeting infra-red, night.

LAPES Low-altitude parachute extraction system.

LBA Luftfahrtbundesamt (German civil aviation authority).

lb Pound, non-SI unit of weight; 0.453592 kg.

lb st Pounds of static thrust.

LCD Liquid crystal display, used for showing instrument information.

LCN Load classification number, measure of 'floatation' of aircraft landing gear linking aircraft weight, weight distribution, tyre numbers, pressures and disposition.

LED Light-emitting diode.

lenticular Lens-shaped in profile, especially when low fineness ratio, although not necessarily symmetrical (aerostats).

lift dumper Spoiler designed to open on landing to reduce lift and thus increase effectiveness of wheel braking.

LINS Laser inertial navigation system.

litre SI unit of volume (0.264177 US gallon; 0.219975 Imp gallon).

L.L.C Limited liability company.

LLTV Low-light TV (thus, L.L.LTV, low-light level); see ALLTV.

LO Low-observables, which see (stealth).

load factor (1) Percentage of maximum payload; (2) design factor (*g* limit) for airframe.

LOC Localiser (which see).

localiser Element giving steering guidance in ILS.

LOH Light observation helicopter.

loiter Fly for maximum endurance, at much less than normal cruise speed.

longerons Principal fore-and-aft structural members (for example in fuselage).

Loran Long-range navigation; family of hyperbolic nav aids based on ground radio emissions, now mainly Loran C.

LOROP Long-range oblique photography.

LOS Line of sight.

low-observables Materials, structures and techniques designed to minimise aircraft signatures of all kinds.

lox Liquid oxygen.

LP Low pressure (LPC, compressor; LPT, turbine).

LRIP Low-rate initial production.

LRMTS Laser ranger and marked-target seeker.

LRU Line-replaceable unit.



LSA: Flight Design CT (Paul Jackson)

1164928

LSA Light Sport Aircraft; US private/sport aircraft category. See Aircraft Type Classifications for explanation and examples. (Note: Official classification is not 'airplane').

Ltd Limited (company constitution).

m Metre(s). SI unit of length (3.28084 feet).

M or Mach number The ratio of the speed of a body to the speed of sound (340 m; 1.116 ft/s in air at 15°C) under the same ambient conditions.

MAD Magnetic anomaly detector.

mass balance Mass attached to flight control surface, typically ahead of hinge axis, internally or externally, to reduce or eliminate coupling with airframe flutter modes.

mass flow Mass of air passing per second (usually at T-O, S/L).

MAWS Missile-approach warning system.

mb Millibar, bar $\times 10^{-3}$.

medevac Medical evacuation.

MFD Multifunction (electronic) display.

MHz Megahertz; 1 million (10⁶) Hertz.

microlight See ultralight.

MIDS Multifunction information distribution system.

MKR Marker beacon receiver.

MLS Microwave landing system.

MLU Mid-life update.

MLW Maximum landing weight.

mm Millimetres, metres $\times 10^{-3}$.

M mo Maximum operating Mach number.

MMS Mast-mounted sight.

MoD Ministry of Defence.

monocoque Structure with strength in outer shell, devoid of internal bracing (semi-monocoque, with some internal supporting structure).

MoU Memorandum of Understanding.

MPA Maritime patrol aircraft.

mph Miles per hour.

MSIP Multistaged improvement program (US).

MTBF Mean time between failures.

MTI Moving-target indication (radar).

MTOW Maximum take-off weight (minus taxi/run-up fuel).

MYP Multiyear procurement (US).

MZFW Maximum zero-fuel weight.

N Newton, SI unit of force, = 0.22480455 lb force.

NACES Navy aircrew common ejection seat (US).

NAS Naval Air Station (US).

NASA National Aeronautics and Space Administration (US).

NASC Naval Air Systems Command (also several other aerospace meanings) (US).

NATC Naval Air Training Command or Test Center (also several other aerospace meanings) (US).

NATO North Atlantic Treaty Organisation.

nav/com Navigation and communications receiver.

NBAA National Business Aircraft Association (US).

NBC Nuclear, biological, chemical (warfare).

NDT Non-destructive testing.

Newton See N.

NFO Naval flight officer; second crew member in US Navy aircraft; compare WSO.

Ni/Cd Nickel/cadmium.

nib Forward-pointing extension at inner end of fixed glove on VG aircraft or leading-edge root extension on light aircraft.

n mile nautical mile, 1.852 km, 1.15078 miles.

NOE Nap-of-the-Earth (low flying in military aircraft, using natural cover of hills, trees and so on).

NV Naamloze Vennootschap (Belgian/Netherlands company constitution).



AN/AVS-9 NVG (SGB Enterprises) 1151662

NVG Night vision goggles.

NVS Noise vibration suppression.

OAO Otkrytolye Aktsionernoye Obshchestvo (JSC; Russian company constitution).

OAT Outside air temperature.

OBIGGS Onboard inert gas generating system.

OBOGS Onboard oxygen generating system.

OCU (1) Operational Conversion Unit; (2) operational capabilities upgrade.

OEI One engine inoperative.

OEU Operational Evaluation Unit.

offset Workshare granted to a customer nation to offset the cost of an imported system.

OGE Out of ground effect; helicopter hovering, far above nearest surface.

OKB Opytniy Konstruktorskiye Byuro (Russian experimental design bureau)

Omega Long-range hyperbolic radio navaid.

OOO Obshchestvo Ogranichennoye Otvetstvennostyu (Russian company constitution).

opeval Operational evaluation.

OTH Over-the-horizon (OTHT adds targeting).

OTPI On-top position indicator (indicates overhead of submarine in ASW).

OWE Operating weight empty, MTOW minus payload, usable fuel and oil and other consumables (thus, includes crew).

pallet (1) for freight, rigid platform for handling by forklift or conveyor; (2) for missile, interface mounting and electronics box outside aircraft.

Pascal SI unit of pressure =1 Nm⁻² (one Newton per square metre).

payload Disposable load generating revenue (passengers, cargo, mail and other paid items); in military aircraft, loosely used to mean total load carried of weapons, cargo or other mission equipment.

performance Aircraft capabilities after S/L take-off at MTOW in ISA with normal full tankage, except as otherwise specified, and with landing data at MLW (where different).

PFA Popular Flying Association (UK).

PGM Precision-guided munition.

phased array Radar in which the beam is scanned electronically in one or both axes without moving the antenna.

Pirate Passive infra-red airborne tracking equipment.

PLA Prelaunch activities.

plane A lifting surface (for example wing, tailplane).

plc Public limited company (company constitution).

plug door Door larger than its frame in pressurised fuselage, either opening inwards or arranged to retract parts before opening outwards.

plume The region of hot air and gas emitted by a helicopter jetpipe.

ply Indication (ply rating) of tyre strength in a specific application; not necessarily the actual number of carcass plies in the tyre.

pneumatic de-icing Covered with flexible surfaces alternately pumped up and deflated to throw off ice.

port Left side, looking forward.

power-by-wire Using electric power alone (not electro-hydraulic) to drive control surfaces and perform other mechanical tasks.

power loading Aircraft weight (usually MTOW) divided by total propulsive power or thrust at T-O. For helicopters, based on transmission rating rather than total engine power.

power train A complete mechanical drive system, for example the sequence of gearwheels, clutches and shafts transmitting power from one or more engines to the rotors of a helicopter.

PPV Pre-production verification.

prepreg Glass fibre cloth or rovings pre-impregnated with resin to simplify layup.

pressure fuelling Fuelling via a leakproof connection through which fuel passes at high rate under pressure.

primary flight controls Those used to control trajectory of aircraft (thus, not trimmers, tabs, flaps, slats, airbrakes or lift dumpers, and so on).

primary flight display Single screen bearing all data for aircraft flight-path control.

propfan A family of new-technology propellers characterised by multiple scimitar-shaped blades with thin sharp-edged profile. Single and contrarotating examples promise to extend propeller efficiency up to an aircraft Mach number of about 0.8.

proprotor Large propeller, tilting for forward or vertical flight.

PT Perusahaan Terbatas (Indonesian company constitution).

Pty Proprietary (company constitution).

pulse Doppler Radar sending out pulses and measuring frequency-shift to detect returns only from moving target (s) seen against background clutter.

pylon Structure linking aircraft to external load (engine nacelle, drop tank, bomb, and so on).

Radar frequency Operating bands of airborne radars are given according to frequency. That part of the electromagnetic spectrum appropriate to above-surface short-range communication and radar (but not OTH) used in aviation is given in the adjacent table with an approximate cross-reference to previously used wavelength bands.

radius The approximate distance an aircraft can fly from base and return without intermediate landing.

RAI Registro Aeronautico Italiano (Italian civil aviation authority).

RAM Radar absorbent material.

ramp weight Maximum weight at start of flight (MTOW plus taxi/run-up fuel).

range Too many definitions to list, but essentially the distance an aircraft can fly (or is permitted to fly) with specified load and usually while making allowance for specified additional manoeuvres (diversions, standoff, go-around and so on).

RAS Rectified airspeed, IAS corrected for position error.

raster Generation of large-area display, for example TV screen, by close-spaced horizontal lines scanned either alternately or in sequence.

RAT Ram air turbine.

The Electromagnetic Spectrum				
Frequency	Wavelength	General Designation	NATO Band	US Band
30-3 kHz	10,000-100 km	ELF		
3-30 kHz	100-10 km	VL.F		
30-300 kHz	10-1 km	L.F		
300 kHz-3 MHz	1,000-100 m	MF		
3-30 MHz	100-10 m	HF	A	
30-230 MHz	10-1.3 m	VHF	A	P
230-250 MHz	1.3-1.2 m	VHF	A	P
250-300 MHz	1.2-1 m	VHF	B	P
300-500 MHz	100-60 cm	UHF	B	P
500-1,000 MHz	60-30 cm	UHF	C	P
1-2 GHz	30-13 cm	UHF	D	L
2-3 GHz	15-10 cm	UHF	E	S
3-4 GHz	10-7.5 cm	SHF	F	S
4-6 GHz	7-5.5 cm	SHF	G	C
6-8 GHz	5-7.5 cm	SHF	H	C
8-10 GHz	3.75-3 cm	SHF	I	X
10-12.5 GHz	3-2.5 cm	SHF	J	X
12.5-18 GHz	2.5-1.6 cm	SHF	J	Ku
18-20 GHz	1.6-1.5 cm	SHF	J	K
20-26.5 GHz	1.5-1.1 cm	SHF	K	K
26.5-30 GHz	1.1-1 cm	SHF	K	Ka
30-40 GHz	10-7.5 mm	EHF	K	Ka
40-60 GHz	7.5-5 mm	EHF	L	mm
60-100 GHz	5-3 mm	EHF	M	mm
100-300 GHz	3-1 mm	EHF		

Notes: Three overlapping descriptive systems are used in the West. General designations are Extremely Low, Very Low, Low, Medium, High, Very High, Ultra High, Super High and Extremely High Frequency. Frequencies are measured in kilo (1,000), mega (1,000,000) and giga (1,000,000,000) cycles per second (Hertz); wavelengths measured in kilometres, metres, centimetres and millimetres. 'NATO' bands describe radar and electronic warfare equipment; 'US' bands are used for radar and satellite communications. The latter's bounds are slightly 'elastic'. Aircraft-to-ground voice communications for air traffic control and similar purposes (including ground ration beacons) uses 108-136 MHz in the VHF band and 225-400 MHz in the V/UHF bands, the latter principally military, and not entirely accurately termed 'UHF'.

rating Any of several values of thrust or shaft power which an engine is qualified (usually also guaranteed) to develop under specified conditions.

RCS Radar cross-section; apparent size of echo.

redundant Provided with spare capacity or data channels and thus able to survive failures.

reversion Ability to switch to manual control following failure of a powered system.

RFAS Russian Federation and Associated States (CIS).

RFP Request(s) for proposals.

rigid rotor See bearingless rotor.

RMI Radio magnetic indicator; combines compass and navaid bearings.

R/Nav Calculates position, distance and time from groups of airways beacons.

RON Research octane number of fuel.

roving Multiple strands of fibre, as in a rope (but usually not twisted).

rpm Revolutions per minute.



RPV and ruddervators combined on BAE Systems Herti (J&AS J6 Frigate) 1151661

RPV Remotely piloted vehicle (pilot in other aircraft or on ground); contrast UAV.

RSA Réseau du Sport de l'Air. French PFA.

ruddervators Flying control surfaces, usually a V tail, that control both yaw and pitch attitude.

RVSM Reduced vertical separation minimum. Halved (1,000 ft) air traffic control separation between FL290 and FL410.

RWR Radar warning receiver.

s Second(s)

SA Soci  t   Anonyme (France, Romania), Sociedad An  nima (Brazil, Spain) or Sp  łka Akcyjna (Poland) (company constitution).

safe-life A term denoting that a component has proved by testing that it can be expected to continue to function safely for a precisely defined period before replacement.

SAM Surface-to-air missile.

SAR (1) Search and rescue; (2) synthetic aperture radar.

SAS Stability augmentation system.

satcom Satellite communications.

sawtooth Same as dog-tooth.

Sdn Bhd Sendirian Berhad (Malaysian company constitution).

SEAD Suppression of enemy air defence(s).

seaplane Floatplane with implied – but rarely actual – ability to operate outside sheltered waters. Compare floatplane; contrast flying boat.

semi-active Homing on to radiation reflected from target illuminated by radar or laser energy beamed from elsewhere (for example, from launch aircraft).

sensitive altimeter Altitude indicator of mechanical type, having acute sensitivity.

service ceiling Usually height equivalent to air density at which maximum attainable rate of climb is 100 ft/min. Compare absolute ceiling and certified altitude.

servo A device which acts as a relay, usually augmenting the pilot's efforts to move a control surface, or the like.

sfc Specific fuel consumption (which see).

shaft Connection between gas-turbine and compressor or other driven unit. Two-shaft engine has second shaft, rotating at different speed, surrounding the first (thus, HP surrounds inner LP or fanshaft).

shipment One item or consignment delivered (by any means of transport) to customer.

shp Shaft horsepower, measure of power transmitted via rotating shaft.

shroud Many meanings, including: (1) a fixed circular duct surrounding a fan or propfan; (2) a ring formed by lateral projections on a rotor (for example fan) blade (part-span or at the tip); (3) a portion of a wing or other fixed aerofoil projecting aft over the leading-edge of a hinged or otherwise movable surface such as a flap, aileron or elevator.

sideline noise EPNdB measure of aircraft landing and taking off, at point 0.25 n mile (2- or 3-engined) or 0.35 n mile (4-engined) from runway centreline.

sidestick Control column in the form of a short handgrip beside the pilot.

sigint Signals intelligence.

signature Characteristic 'fingerprint' of all acoustic or electromagnetic radiation (radar, IR, and so on).

single-aisle Passenger cabin has seats on each side of a single aisle along or near the centre.

single-shaft Gas-turbine in which all compressors and turbines are fixed to common shaft.

S/L Sea level.

SLAR Side-looking airborne radar.

slat Auxiliary curved or mini-aerofoil surface designed to prevent flow breakaway from a wing or tail. On a tail leading-edge it may be fixed, leaving a narrow slot. On a wing it is almost always retractable, normally flush with the wing profile but extended (under power or by aerodynamic lift) to leave a narrow slot for take-off, low-speed loiter or landing.

slot, slotted See slat.

S-LSA Special (factory-built) Light Sport Aircraft. See LSA.

snap-down Air-to-air interception of low-flying aircraft by AAM fired from fighter at a higher altitude.

SONAR, sonar Sound navigation and ranging.

SpA Societ   per Azioni (Italian company constitution).

specific fuel consumption Rate at which fuel is consumed divided by power or thrust developed, and thus a measure of engine efficiency. For jet engines (air-breathing, not rockets) unit is mg/Ns, milligrams per Newton-second; for shaft engines unit is $\mu\text{g/J}$, micrograms (millionths of a gram) per Joule (SI unit of work or energy).

spoiler Plank-like surface normally recessed into top of wing, hinged up under power to reduce (spoil) lift and increase drag. Used asymmetrically for lateral control.

spoileron Small spoiler augmenting ailerons.

sportplane Light aircraft design in which performance takes precedence over utility.

Sp. z o.o Sp  łka z ograniczon   odpowiedzialno  ci   (Polish company constitution)

Srl Societ   Responsibilit   Limitata (Italian company constitution).

SSB Single-sideband (radio).

SSR Secondary surveillance radar.

SST Supersonic transport.

st Static thrust.

stabilator One-piece, all-moving horizontal tail, combining functions of horizontal stabiliser and elevator.

stabilizer Tailplane (US); vertical stabilizer = fin.

stall Sudden near-total loss of lift of a wing because AoA has exceeded a critical value.

stall strips Sharp-edged strips on wing leading-edge to induce stall to initiate at that point.

stalling speed Airspeed at which aircraft stalls at 1g.

starboard Right side, looking forward.

static inverter Solid-state (not rotary machine) inverter of alternating wave-form to produce DC from AC.

STC Supplementary Type Certificate.

stealth See low-observables.

stick-pusher Stall-protection device that forces pilot's control column forward as stalling angle of attack is neared.

stick-shaker Stall-warning device that noisily shakes pilot's control column as stalling angle of attack is neared.

STOL Short take-off and landing. (Several definitions, stipulating allowable horizontal distance to clear screen height of 35 or 50 ft or various SI measures.)

store Object carried as part of payload on external attachment (for example bomb, drop tank).

STOVL Short take-off, vertical landing.

strobe light High-intensity flashing beacon.

supercritical wing Wing of relatively deep, flat-topped profile generating lift right across upper surface instead of concentrated close behind leading-edge.



Sweepback: early example demonstrated by NAA F-86 Sabre (Paul Jackson) 1164929

sweepback Backwards inclination of wing or other aerofoil, seen from above, measured relative to fuselage

or other reference axis, usually measured at quarter-chord (25 per cent) or at leading-edge.

t Tonne, 1 Megagram, 1,000 kg.

tab Small auxiliary surface hinged (flight-adjustable) or attached in a fixed position (ground-adjustable) to trailing-edge of control surface for trimming, balancing (reducing hinge moment: force needed to operate main surface) or in other way assisting pilot. Compare anti-balance tab.

tabbed flap Fitted with narrow-chord tab along trailing-edge which deflects to greater angle than main surface.

Tacan Tactical air navigation. UHF navaid giving bearing and distance to ground beacons; distance element (see DME) can be paired with civil VOR.

taileron Left and right tailplanes used as primary control surfaces in both pitch and roll.

tailplane Horizontal stabiliser; main horizontal tail surface, originally fixed and carrying hinged elevator(s) but today often a single 'slab' serving as control surface (see stabiliser, stabilator).

TANS Tactical air navigation system; Decca Navigator or Doppler-based computer, control and display unit.

TAS True airspeed, EAS corrected for density (often very large factor) appropriate to aircraft altitude.

TBO Time between overhauls.

t/c ratio Ratio of the thickness (aerodynamic depth) of a wing or other surface to its chord, both measured at the same place parallel to the fore-and-aft axis.

TCAS Traffic-alert and collision-avoidance system.

Tercom Terrain-comparison (or contour-matching), navigation aid which compares relief of terrain with profile stored in memory.

TFR Terrain-following radar (for low-level attack).

thickness Depth of wing or other aerofoil; maximum perpendicular distance between upper and lower surfaces.

thrust vectoring Rotation of a vehicle's thrust axis to control its trajectory or support its weight.

TIALD Thermal imaging and laser designation (pod).

tiltrotor Aircraft with fixed wing and rotors that tilt up for hovering and forward for fast flight.

T-O Take-off.

T-O noise EPNdB measure of aircraft taking off, at point directly under flight path 3.5 n miles from brakes-release.

TOGW Take-off gross weight (not necessarily MTOW)

ton Imperial (long) ton = 1.016 t (or 2,240 lb, US (short) ton = 0.9072 t or 2,000 lb).

track Distance between centres of contact areas of main landing wheels measured left/right across aircraft (with bogies, distance between centres of contact areas of each bogie).

transceiver Radio transmitter/receiver.

transformer-rectifier Device for converting AC to DC at a different voltage.

transponder Radio transmitter triggered automatically by a particular received signal, as in secondary surveillance radar (SSR).



Eurocopter B   105 of TsENTROSPAS (Paul Jackson) 1164930

TsENTROSPAS (in Russian Federation) Ministry for Civil Defence, Emergencies and Elimination of the Consequences of Natural Disasters.

turbofan Gas-turbine jet engine generating most thrust by a large-diameter cowled fan, with small part added by jet from core.

turbojet Simplest form of gas turbine comprising compressor, combustion chamber, turbine and propulsive nozzle.

turboprop Gas turbine in which as much energy as possible is taken from gas jet and used to drive reduction gearbox and propeller.

Example microlight/ultralight maxima						
Country	Name	Seat(s)	Empty weight	MTOW	Fuel	V _{so}
Australia	Ultralight	1-2		544 kg		
France	ULM ¹	1		300 kg ²		35 kt ³
	ULM ¹	2		450 kg ²		35 kt ³
Germany	Ultralicht	1-2		472.5 kg ⁵		
UK	Microlight	1-2		450 kg ²		35 kt
USA	Ultralight (Pt 103)	1	254 lb ⁴		5 USg	24 kt
	LSA	1-2		1,320 lb ⁵		

¹ Ultra leger motorise; criteria accepted by several European countries

² Plus 10 per cent for seaplanes and amphibians

³ Plus 5 per cent for seaplanes and amphibians

⁴ Not including floats and deployable emergency devices

⁵ Plus 8.3 per cent for seaplanes and amphibians

turboshaft Gas turbine in which as much energy as possible is taken from gas jet and used to drive high-speed shaft (which in turn drives external load such as helicopter transmission).

twist Progressive change of angle of incidence of a wing, rotor blade or other aerofoil from root to tip.

Type Certificate Airworthiness licence granted to enable a manufacturer to produce and market a specified type of aircraft (compare C of A).

tyre sizes Five systems of classification are in current use; Type I, consisting of a single figure indicating nominal diameter in inches, is obsolete. See adjacent table and also 'ply'.

UAV Unmanned (or uninhabited) aerial vehicle; contrast RPV.

UHCA Ultra-high capacity airliner.

UHF Ultra-high frequency.

ultralight Light aircraft with parameters below specified national limits, qualifying for less rigorous licensing; also known as microlight. See table at top of page.

upper surface blowing Turbofan jet expelled over upper surface of wing to increase lift.

usable fuel Total mass of fuel consumable in flight, usually 95 to 98 per cent of system capacity.

useful load Usable fuel and other consumables plus payload.

US gallon 0.83267 Imperial gallon; 3.785 litres.

UV Ultra-violet.

'V-speeds' Shorthand notation of significant speeds within an aircraft's flight envelope (see table).



Variable geometry wings, on the laughing gull (Paul Jackson) 1164931

variable geometry Capable of grossly changing shape in flight, especially by varying sweep of wings.

variable pitch Propeller with its blades held in rotary bearings in the hub, so that pitch (of all blades in unison) can be altered in flight. See constant speed; compare ground- and flight-adjustable pitch.

VDU Video (or visual) display unit.

vectored Capable of being pointed in different directions.

vertrep Vertical replenishment.

VFR Visual flight rules.

VHF Very high frequency.

VLF Very low frequency (area-coverage navaid).

VMS Vehicle management system.

V-speeds definitions

V₁	Decision speed, up to which it should be possible to abort a take-off after failure of the critical engine and stop safely within the remaining runway length. After reaching V ₁ the take-off must be continued.	V_H	Maximum level-flight speed with maximum continuous power.	V_{REF}	Any reference or 'bug' speed, typically quoted for approach speeds.
V₂	Minimum take-off safety speed.	V_{LE}	Maximum speed with landing gear extended.	V_{SO}	Stalling speed at maximum take-off weight, in landing configuration with flaps and landing gear down, at sea level, ISA conditions (bottom of white arc on ASI). Also V _S , stalling speed 'clean', and V _{SI} , stalling speed for a given configuration other than 'clean'.
V_A	Design manoeuvring speed. The speed below which abrupt and extreme control movements are possible (though not advised) without exceeding the airframe's limiting load factors.	V_{MCA}	Minimum control speed (air). Minimum speed at which directional control of a multi-engined aircraft can be maintained after failure of critical engine (in effect, the lowest speed at which the aircraft possesses sufficient rudder authority to counteract the yaw induced by asymmetric thrust).	V_{SSE}	Minimum speed for deliberate shutting down of one engine for purposes of asymmetric flight training.
V_B	Design speed for maximum gust intensity.	V_{MO}	Maximum operating speed. Also M _{MO} , maximum operating Mach No.	V_X	Best angle of climb speed on all engines. Sometimes (UK usage) V _q .
V_C	Design cruising speed.	V_{MU}	Minimum unstuck speed.	V_{XSE}	Best engine-out angle of climb speed.
V_D	Design diving speed.	V_{NE}	Never-exceed speed.	V_Y	Best rate of climb speed on all engines.
V_{DF}	Maximum demonstrated diving speed. Also M _{DF} , maximum demonstrated Mach No. in a dive.	V_{NO}	Normal operating speed. The maximum structural cruising speed allowable for normal operating conditions.	V_{YSE}	Best engine-out rate of climb speed. Sometimes V _{qSE} .
V_E	Maximum speed at which landing gear (or other item) may be extended or retracted (cycled).	V_R	Rotation speed, at which to raise the nose for take-off.	V_{ZRC}	Zero rate of climb speed (on one engine, where drag of inoperative engine reduces climb gradient to zero).
V_{FE}	Maximum flap extension speed (top of white arc on ASI).	V_{RA}	Rough-air speed. Maximum recommended airspeed for penetrating turbulent air.		

AIRCRAFT

Argentina

LMAASA

LOCKHEED MARTIN AIRCRAFT ARGENTINA SA

Avenida Fuerza Aérea Argentina Km 5500, X5010JMN Córdoba

Tel: (+54 351) 466 87 13

Fax: (+54 351) 466 87 34

e-mail: busdev@lmaasa.com

PRESIDENT: Alberto O Buthet

BUSINESS DEVELOPMENT MANAGER: Emilio Mahgur

Original FMA (Military Aircraft Factory) came into operation 10 October 1927 as central organisation for aeronautical research and production; underwent several name changes before reverting, in 1968, to original title as component of Aérea de Material Córdoba (AMC) of Argentine Air Force. FMA converted into a joint stock company from April 1992, Air Force buying 30 per cent of the shares to establish itself as holding and management authority; control of FMA handed over to Planning Secretary of MoD on 20 December 1993. MoD and Lockheed Aircraft Argentina SA signed concession agreement on 15 December 1994, allocating management of FMA to Lockheed Martin, now Lockheed Martin Aircraft Argentina SA, from 1 July 1995.

Principal activities are divided into three market segments: current tasks (1) aircraft maintenance, modification and upgrade, including A-4AR Fighting Hawk C-130 Hercules, Fokker F-27 and F-28, IA 58 Pucará, T-34 Mentor, Boeing 737 and AT-63 Pampa; (2) manufacturing of parts, subassemblies, assemblies and composites components; and (3) engine maintenance for T56, Atar 09C, TFE731, J52, T53 and JT8D power plants. Argentine Air Force maintenance contract renewed in January 2001 for five years at estimated value of USD230 million, but national financial crisis severely curtailed military contracts; however, new, five-year FAA maintenance contract secured on 5 February 2004, plus others for Bolivia and Colombia, and parts manufacture for Chile and Lockheed Martin USA.

Laboratories, factories and other aeronautical division buildings occupy total covered area of 220,000 m² (2,368,075 sq ft); had workforce of approximately 1,000 in 2006. Córdoba facility also accommodates Centro de Ensayos en Vuelo (Flight Test Centre), a separate division also controlled by Argentine Air Force, at which all aircraft produced in Argentina undergo certification testing. Hiatus in AT-63 programme resolved with reactivation of contracts in February 2004.

LMAASA AT-63 PAMPA

TYPE: Basic jet trainer/light attack jet.

PROGRAMME: First-generation IA 63 Pampa initiated by Fuerza Aérea Argentina (FAA; Argentine Air Force) 1979, eventual configuration being selected over six other designs early 1980, with Dornier of Germany providing technical assistance (including manufacture of prototypes' wings and tailplanes); two static/fatigue test airframes and three flying prototypes built (first flight, by EX-01, 6 October 1984); first flight of production Pampa October 1987; 14 of initial batch of 18 (including three prototypes) delivered to FAA (10 survivors currently serving 1 Escuadrón de 4 Grupo de Caza at El Plumerillo, Mendoza) from 1988; expected follow-on order for 46 did not materialise, and Argentine Navy requirement for 12 long remained in abeyance, but one new aircraft (E-816), assembled from existing and new components, delivered to FAA on 28 September 1999.

'New-generation' Pampa NG revealed late 1997 and offered to Argentine Air Force and Navy.

Resumption of activity announced 29 June 2000 to upgrade 12 Pampas to new AT-63 (with hyphen) configuration; deliveries then scheduled to begin in 2003 and end in June 2005; USD230 million contract (2001) included option for further 12 from new production (six for FAA and six for export). This reaffirmed in January 2001 to be part of five-year FAA support contract placed with LMAASA. Argentine Navy interest renewed in 2000; initial batch of eight then in prospect.

Work was suspended in 2002 because of national financial crisis; contracts reactivated in February 2004, covering six for Argentina and six for export, resulting in roll-out of first upgraded AT-63 (former IA 63 prototype EX-03, renumbered AT-03) on 15 December 2004, at which time first flight was scheduled for June 2005 — duly achieved on 23 June — and delivery in December 2005. By March 2005, manufacturer was discussing funding options with Argentine government for demonstrator with TFE731-40 engine, as envisaged for upgraded AT-63.

CURRENT VERSIONS: **IA 63 Pampa:** Standard Argentine Air Force version. Production complete.

Naval version: Would have strengthened landing gear, uprated engine and some changed avionics.

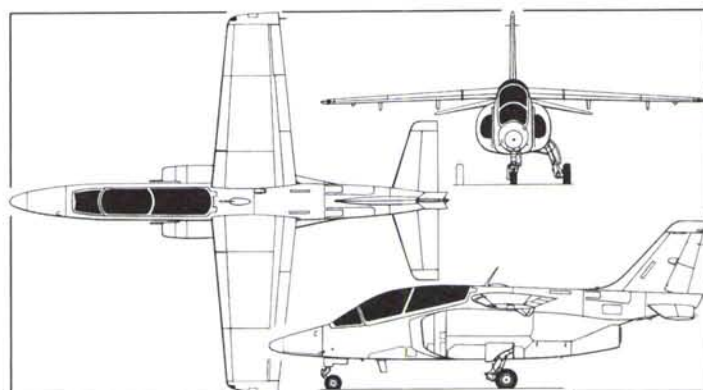
Pampa 2000 International: Not proceeded with.

Pampa NG A: Proposed advanced trainer with updated avionics. Essentially became AT-63 (initial version).



LMAASA AT-63 Pampa Phase II

1158854



LMAASA AT-63 Pampa two-seat basic and advanced jet trainer

(Dennis Punnett)

1158782

Pampa NG B: Proposed combat-capable version; uprated engine and avionics. Features to be incorporated in later upgrade of AT-63.

AT-63: Attack/trainer. Announced 2001 as new standard version for Argentine Air Force and potential export. Two prototypes modified from existing IA 63s in 2001-02; first flight planned for November 2002, but delayed following funding problems of FAA; rescheduled for mid-2005 following 15 December 2004 roll-out. Initial version (Pampa Phase II) features new processor for DECUI, Elbit avionics suite (MIL-STD-1553B databus, mission computer, RLG INS/GPS, integrated weapons system, liquid crystal MFD in each cockpit, and front cockpit HUD).

Customised advanced version (Pampa Phase III) proposed (originally for 2005) with structurally enhanced (+7/-3 g) wing, 18.7 kN (4,200 lb st) TFE731-40 engine and 390 kt (722 km/hr; 489 mph) max level speed, missionised avionics with enhanced tactical capabilities, nose-mounted laser range-finder, fin-mounted RWR, conformal chaff/flare dispensers, two additional hardpoints (total seven) for AAMs and strengthened landing gear for increased MTOW.

AT-63 version also proposed with Lockheed Martin AN/APG-67(V)4 multimode radar in response to Colombian interest; announced at FIDAE, Chile, April 2002 that Lockheed Martin Naval Electronics & Surveillance Systems (now Lockheed Martin Maritime Systems and Sensors) selected to integrate APG-67 in Pampa. Also reported that Singapore evaluated AT-63 in early 2003 as S.211 replacement.

Description applies to Phase II Pampa.

CUSTOMERS: Argentine Air Force 18 AT-63 (12 upgraded Phase II and six new-build Phase III). Six of later also to be produced for export, possibly to Colombia, which reported (mid-2002) to have potential interest in up to 24.

COSTS: USD8 million to USD9 million, including radar (estimated, 2002).

DESIGN FEATURES: Intended for cost-effective pilot training in mission management techniques, advanced fighter lead-in training and extended-range anti-drug patrol missions. High degree of commonality with the original IA 63 Pampa, providing a customised low life-cycle cost fleet. Fail-safe service life 8,000 hours.

Non-swept shoulder-mounted wings and anhedral tailplane, sweptback fin and rudder; single engine with twin lateral air intakes. Wing section Dornier DoA-7/8 advanced transonic; leading-edge sweep 5° 24'; thickness/chord ratio 14.5 per cent at root, 12.5 per cent at tip; anhedral 3°.

FLYING CONTROLS: Conventional hydraulically powered ailerons, rudder, all-moving tailplane, single-slotted Fowler flaps, and door-type airbrake, deployable at all speeds, on each side of upper rear fuselage; primary surfaces have Liebherr tandem actuators and electromechanical trim.

STRUCTURE: Conventional all-metal semi-monocoque/stressed skin; two-spar wing box forms integral fuel tank. Modified fuselage nosecone, tailcone and fin tip in AT-63.

LANDING GEAR: SHL (Israel) retractable tricycle type, with hydraulic extension/retraction and emergency free-fall extension. Oleo-pneumatic shock-absorbers. Single Messier-Bugatti wheel on each unit with Goodrich (main) or Continental (nose) low-pressure tyre; nosewheel offset 10 cm (3.9 in) to starboard. Tyre sizes 6.50 10 (10 ply) on mainwheels, 380x150 (4/6 ply) on nosewheel, with respective pressures of 6.55 bar (95 lb/sq in) and 4.00 bar (58 lb/sq in). Nosewheel retracts rearward, mainwheels inward into underside of engine air intake trunks. Messier-Bugatti mainwheel hydraulic disc brakes incorporate anti-skid device; nosewheel steering (±47°). Gear designed for operation from unprepared surfaces.

POWER PLANT: One 15.57 kN (3,500 lb st) Honeywell TFE731-2C turbofan installed in rear fuselage. Single-point pressure refuelling, plus gravity point in upper surface of each wing. Standard internal fuel capacity of 968 litres (255 US gallons; 213 Imp gallons) in integral wing tank of 550 litres (145 US gallons; 121 Imp gallons) and 418 litre (110 US gallon; 92.0 Imp gallon) flexible fuselage tank with a negative g chamber permitting up to 10 seconds of inverted flight. Additional 415 litres (109 US gallons; 91.0 Imp gallons) can be carried in auxiliary tanks inside outer wing panels, to give a maximum internal capacity of 1,383 litres (364 US gallons; 304 Imp gallons). Provision on centre underwing stations for two external drop tanks, each of 317 litres (83.7 US gallons; 69.7 Imp gallons). Total fuel capacity 2,017 litres (533 US gallons; 444 Imp gallons).

ACCOMMODATION: Crew of two in tandem, rear seat elevated, on UPC (Stencel) S-III-S3IA63 zero/zero ejection seats. Ejection procedure can be preselected for separate single ejections, or for both seats to be fired from front or rear cockpit. HOTAS operation; dual controls standard. One-piece wraparound windscreen. One-piece canopy, with internal screen, is hinged at rear and opens upward. Entire accommodation pressurised and air conditioned.

SYSTEMS: Honeywell environmental control system, maximum differential 0.30 bar (4.4 lb/sq in), supplied by high- or low-pressure engine bleed air, provides a 1,980 m (6,500 ft) cockpit environment up to flight level 5,730 m (18,800 ft) and also provides ram air for negative g system and canopy seal. Oxygen system supplied by 10 litre (0.35 cu ft) lox converter. Engine air intakes anti-iced by engine bleed air.

Two independent hydraulic systems, each at pressure of 207 bar (3,000 lb/sq in), each supplied by engine-driven pump. Each system incorporates a bootstrap reservoir pressurised at 4 bar (58 lb/sq in). No.1 system, with flow rate of 16 litres (4.2 US gallons; 3.5 Imp

gallons/min, actuates primary flight controls, airbrakes, landing gear and wheel brakes; No. 2 system, with flow rate of 8 litres (2.1 US gallons; 1.75 Imp gallons)/min, actuates primary flight controls, wing flaps, emergency and parking brakes, and nosewheel steering. Honeywell ram air turbine provides emergency hydraulic power for No. 2 system if engine shuts down in flight and pressure in this system drops below minimum.

Electrical system (28 V DC) supplied by Lear Siegler 400 A 11.5 kW engine-driven starter/generator; secondary supply (115/26 V AC power at 400 Hz) from two Flite-Tronics 450 VA static inverters and two SAFT 27 Ah sealed lead batteries. Thirty minutes of emergency electrical power available in case of in-flight engine shutdown.

AVIONICS: Comms: Two VHF/UHF transceivers and direction-finder, intercom and IFF or ATC transponder.

Radar: Lockheed Martin AN/APG-67(V)4 multimode radar optional (not fitted in Argentine Air Force aircraft).

Flight: VOR/ILS with marker beacon receiver; DME or Tacan optional; autonomous EISIS/air data computer, HSI, ADF, ADI; Honeywell HG 764 laser INS with GPS; radar altimeter; air data computer.

Instrumentation: Single 127 mm (5 in) HUD (multimode: UFCP, PDU, PSVS and camera); colour HUD camera/airborne videotape recorder; video repeater; 12.7 x 17.8 cm (5 x 7 in) liquid crystal MFD in each cockpit for Argentine Air Force; second, similar MFD in each cockpit (for EICAS) for export version; Multirole central computer and MIL-STD-1553B digital databus.

Mission: New integrated weapon delivery system. Mission computer/symbol generator/integrated comms; weapon management system/data transfer unit; steerable laser ring finder optional; radar warning receiver optional; chaff/flare dispenser.

ARMAMENT: Five stations for external stores, stressed for 440 kg (970 lb) on centre fuselage and each inboard underwing station, 290 kg (639 lb) on each outboard underwing station, all at +5.5/-2 g. Phase III aircraft will have further pair of pylons further outboard, each rated at 170 kg (375 lb), for total of seven, plus uprated inboard wing pylons. Several external stores configurations including Mk 81 and Mk 82 bombs; LAU-32, LAU-51 and LAU-10 rocket pods; 30 mm gun pod (centreline), twin machine gun pods; and CBL5 200 practice bomb carriers.

DIMENSIONS, EXTERNAL:	
Wing span	9.69 m (31 ft 9½ in)
Wing aspect ratio	6.0
Length overall	10.93 m (35 ft 10¼ in)
Height overall	4.29 m (14 ft 1 in)
Tailplane span	4.58 m (15 ft 0 ¼ in)
Wheel track	2.66 m (8 ft 8 in)
Wheelbase	4.42 m (14 ft 6 in)

AREAS:	
Wings, gross	15.63 m² (168.3 sq ft)
Ailerons (total)	0.89 m² (9.58 sq ft)
Trailing-edge flaps (total)	2.93 m² (31.54 sq ft)
Fin	1.86 m² (20.02 sq ft)
Rudder	0.655 m² (7.05 sq ft)
Tailplane	4.35 m² (46.87 sq ft)

WEIGHTS AND LOADINGS (estimated):	
Weight empty	2,820 kg (6,217 lb)
Max fuel weight:	
fuselage	327 kg (721 lb)
wings, internal inboard	430 kg (948 lb)
wings, internal outboard	325 kg (717 lb)
underwing drop tanks	496 kg (1,093 lb)
Max external stores load	1,900 kg (4,189 lb)
Max T-O weight	5,000 kg (11,023 lb)
Max wing loading	319.9 kg/m² (65.52 lb/sq ft)
Max power loading	321 kg/kN (3.15 lb/lb st)

PERFORMANCE (estimated at 3,764 kg; 8,300 lb clean T-O weight with normal internal fuel, except where indicated):	
Max level speed at 7,985 m (25,900 ft)	440 kt (814 km/h; 506 mph)
Max operating speed (VMO)	M0.8
Econ cruising speed at 9,145 m (30,000 ft)	350 kt (648 km/h; 402 mph)
Stalling speed at S/L, 50% normal internal fuel:	
flaps up	104 kt (193 km/h; 120 mph)
flaps down	82 kt (152 km/h; 95 mph)
Max rate of climb at S/L	1,560 m (5,118 ft)/min
Service ceiling	12,900 m (42,320 ft)
T-O run	430 m (1,410 ft)
Landing run at 3,497 kg (7,710 lb)	460 m (1,510 ft)
Radius of action:	
air-to-air (hi-hi), T-O weight of 4,300 kg (9,480 lb) with 254 kg (560 lb) external load, 5 min allowance for dogfight, normal internal fuel, 30 min reserves	380 n miles (703 km, 437 miles)
air-to-ground (hi-lo-lo-hi), 30 n mile dash out/in, T-O weight of 5,000 kg (11,023 lb) with 1,000 kg (2,205 lb) external load, max internal fuel, 5 min allowance for weapon delivery, plus 30 min reserves	236 n miles (127 km, 205 miles)
Ferry range 9,145 m (30,000 ft), ISA with 15 min reserves	1,140 n miles (2,111 km; 1,311 miles)
g limits	+6/-3

Australia

BRAND

BEST BRAND AUSSIE-AERO P/L
29 Cochran Avenue, Camberwell, Victoria 3124
Tel: (+61 8) 98 82 90 62
e-mail: admin@brandynamics.net
Web: www.brandynamics.com
DIRECTOR: Rolf Brand

In 1985, Dr Brand produced the Leaders AM-JB1 light aircraft (22.7 kW; 30 hp Cuyuna 430R), registered N212RB, and AM-DS1 which was offered to the US Department of Defense. Dr Brand is now concentrating his efforts on promoting the current RB-1 and its associated Enviro propeller. The latter is another of Rolf Brand's inventions and is marketed by his subsidiary company, Best Brand Propeller. Efficiency tests have shown it able to produce 210 kg (463 lb) of thrust from a 44.5 kW (60 hp) input when rotating at 2,000 rpm, an improvement of some 15 to 20 per cent over existing units.

BRAND RB-1

TYPE: Single-seat ultralight kitbuilt.
PROGRAMME: Demonstrator (10-1450) built and flown in early 1990s. Original composites wings judged to be too heavy and replaced by current units, reflown as such in July 2004.
Funding sought for further development and marketing, to which end aircraft shown statically at Australian International Air Show, Avalon, March 2005. Intention is Chinese manufacturer for sale in Australia as kitplane.
COSTS: Kit USD18,500 (2005).
DESIGN FEATURES: Unconventional, modular ultralight structure, resembling pod-and-boom layout but with 'half length' boom attached to centre rear of tubular metal pod framework and pusher propeller rotating around intact (thus, structurally unimpaired) boom at approximate CG.
High-mounted wing of constant chord; cruciform empennage attached to rear of boom. Empennage efficiency increased by central prop-wash. Wings braced to pod by metal tube struts; empennage braced to wing by wires.
FLYING CONTROLS: Manual. Half-span Junkers ailerons outboard.
STRUCTURE: Aluminium boom (may be reinforced by composites for later versions with increased engine power). Wing of aluminium tube and ribs, with fabric covering; composites ailerons and empennage. Steel tube pod structure clad in composites.
LANDING GEAR: Tailwheel type; fixed. Axle type, steel tube main gear on prototype; cantilever spring type envisaged for production version.
POWER PLANT: Brand compact axial thrust (CAT) system comprising 48.0 kW (64.4 hp) Rotax 582 two-cylinder piston engine mounted at CG, below boom, turning propeller on a flexible mount, cancelling torque. Propeller hub rotates around boom; three advanced technology Enviro propeller blades bolted to hub, each blade of hollow construction. Blade material according to application; typically glass fibre and Kevlar. Composites fuel tank of spherical shape between cockpit and engine; capacity 45 litres (11.9 US gallons; 9.9 Imp gallons).
DIMENSIONS, EXTERNAL:
Wing span 8.50 m (27 ft 10¾ in)
Length overall 6.00 m (19 ft 8¼ in)



Brand RB-1 prototype and example of Enviro propeller (Paul Jackson) 1151702



Brand RB-1 prototype fitted with replacement wings (Paul Jackson) 1121761

DIMENSIONS, INTERNAL:	
Cockpit max width	0.68 m (2 ft 2¾ in)
AREAS:	
Wings, gross	10.75 m² (115.7 sq ft)
WEIGHTS AND LOADINGS:	
Weight empty	185 kg (408 lb)
Max T-O weight	300 kg (661 lb)
PERFORMANCE:	
Max level speed	92 kt (170 km/h; 106 mph)
Cruising speed	59 kt (110 km/h; 68 mph)
Stalling speed	27 kt (50 km/h; 32 mph)
Max rate of climb at S/L	122 m (400 ft)/min
T-O run	60 m (200 ft)
Landing run	100 m (330 ft)
Range	189 n miles (350 km; 217 miles)

BRUMBY

BRUMBY AIRCRAFT AUSTRALIA

Hangar 112, Airport Road, Cowra, New South Wales 2794
Tel: (+61 2) 63 41 16 35
e-mail: pgaviation@bigpond.com.au
Web: www.pgaviation.com.au
MANAGING DIRECTOR: Phil Goard

Having designed and built a prototype of the Goair Products GT-1 Trainer at Bankstown Airport, Sydney, Mr Goard transferred to Cowra under a new company name in 2004 to build a development, the Brumby. PG Aviation offers a variety of aircraft services, including material supplies, repair, manufacture, sales and issue of airworthiness certificates.

BRUMBY BRUMBY

TYPE: Side-by-side lightplane/kitbuilt.
PROGRAMME: Development of Goair GT-1 Trainer, which first flown (VH-BBR) July 1995 and followed by second machine in 2001. No further production known. Brumby (an Australian wild horse) first demonstrated (19-4462) at RA-Aus Natfly exhibition, Narromine, in April 2006. Pre-production batch of five under assembly in 2006, being registered in Ultralight or Experimental category.
COSTS: Kit AUD43,500, plus tax, excluding engine (2006).
DESIGN FEATURES: Optimised for Australian RAA (544 kg; 1,200 lb) or US LSA category. Design aims included short-field performance, good visibility and docile stall characteristics. Low wing of trapezoidal planform, apart from small constant-cord centre section. Trapezoidal empennage surfaces incorporate balanced, full-height rudder and horn-balanced elevators.
FLYING CONTROLS: Conventional and manual. Frise ailerons and slotted flaps. Actuation by pushrods or (rudder) cables; flaps electrically operated.
STRUCTURE: Generally of aluminium alloy.

LANDING GEAR: Tricycle type; fixed. Fuselage-mounted spring cantilever mainwheel legs; telescoping, steerable nosewheel. Hydraulic brakes. Fairings on all wheels.
POWER PLANT: One piston engine driving a two-blade, wooden propeller. Option of 59.6 kW (59.6 hp) Rotax 912 UL, 73.5 kW (98.6 hp) Rotax 912 ULS, 59.7 kW (80 hp) Jabiru 2200, 89 kW (120 hp) Jabiru 3300 (as prototype) or approx 82.0 kW (110 hp) Corvair 2700. Fuel in wing tanks; combined capacity 120 litres (31.7 US gallons; 26.4 Imp gallons).
ACCOMMODATION: Two persons, side-by-side, under forward-sliding canopy/windscreen; large fixed transparency covering baggage area to rear of seats. Optional gull wing canopy.
AVIONICS: To customer's specification.
DIMENSIONS, EXTERNAL:
Wing span 8.53 m (28 ft 0 in)
Wing chord at root 1.52 m (5 ft 0 in)
Wing aspect ratio 7.5
Length overall 6.25 m (20 ft 6 in)
Height overall 2.13 m (7 ft 0 in)
DIMENSIONS, INTERNAL:
Baggage area volume 0.17 m³ (6.0 cu ft)
AREAS:
Wings, gross 9.75 m² (105.0 sq ft)
WEIGHTS AND LOADINGS:
Weight empty 312 kg (688 lb)
Max T-O weight 600 kg (1,322 lb)
Max wing loading 61.5 kg/m² (12.59 lb/sq ft)
PERFORMANCE (Jabiru 3300 engine):
Never-exceed speed (VNE) 140 kt (259 km/h; 161 mph)
Max level speed 125 kt (232 km/h; 144 mph)
Normal cruising speed 115 kt (213 km/h; 132 mph)
Stalling speed, flaps down 38 kt (71 km/h; 44 mph)
Max rate of climb at S/L 305 m (1,000 ft)/min
T-O run 198 m (650 ft)
Landing run 183 m (600 ft)
Endurance 5 h



Brumby Aircraft Australia Brumby two-seat lightplane or ultralight

1158060

COBRA

COBRA AVIATION

40 Industry Place, Bayswater, Victoria 3153
Tel: (+61 3) 97 20 69 66
Fax: (+61 3) 97 20 31 33
e-mail (1): sales@cobraaviation.com.au
e-mail (2): tom@tomair.com.au
Web (1): www.cobraaviation.com.au
Web (2): www.tomair.com.au
MANAGING DIRECTOR: Tom Wickers

Company founded in 2000 as Tomair Aircraft Sales; subsequently formed Cobra Aviation, for marketing of Arrow, Explorer and Landseair.

COBRA ARROW

TYPE: Side-by-side ultralight kitbuilt; side-by-side motor glider kitbuilt.
PROGRAMME: Non-flying exhibition airframe, then incomplete, displayed at Avalon Air Show, February 2001; prototype (19-3700) was removed from its moulds in August 2001 and was fitted out in late 2001/early 2002. First flight 18 May 2002. Conventional tailplane and elevators replaced in July 2002 by stabilator. First tailwheel version (19-3988) under construction (Kim Penglaze, Victoria), in mid-2003; was complete by 2005.
CURRENT VERSIONS: **Arrow**: Standard version, as described. Available to Ultralight or Certified rules.
Arrow M/G: Motor glider version with 3.66 m (12 ft) increase in wing span.
Explorer: Described separately.
CUSTOMERS: Total of 30 kits sold by January 2006; first production kit shipped to New Zealand customer in March 2003.
COSTS: Arrow Sport kit, less engine, instruments and retractable landing gear, AUD42,850, plus tax. Quick-build AUD11,000 extra, reduces build time by 100 hours (2006).



First Cobra Arrow built by an Australian constructor

1037912

DESIGN FEATURES: Derived from US Polliwagen homebuilt, described in 1983-84 and earlier editions. Designed to meet AUF 51 per cent amateur-built rules. Conventional low-wing monoplane; sweptback T tail. Kit comprises prejoined fuselage mouldings with cowlings, canopy and main spar carry-through installed; tail surfaces; wing skins with main spar installed; laser-cut profiles for rib shapes; carbon fibre instrument panel; plus seats, fuel cells, control columns, rudder pedals and hardware. Wings detach for storage and transportation. Quoted average build time 350 hours.
FLYING CONTROLS: Manual. Ailerons, rudder and stabilator. Flaps.
STRUCTURE: Mostly of pre-moulded composites.
LANDING GEAR: Option of tailwheel type, fixed; or tricycle type, fixed or retractable. From mid-2003, wheel sizes 6.00x6 main; 5.00x6 nose.
POWER PLANT: Prototype has one 74.6 kW (100 hp) Subaru EA81 and Bolly Optima three-blade propeller. Other suitable engines include JPX 4TX75, Rotax 582, 912 and 914,

Jabiru 2200 and 3300, Mazda rotary and Textron Lycoming O-200 and O-360. Fuel capacity 71.9 litres (19.0 US gallons; 15.8 Imp gallons); optionally 130 litres (34.3 US gallons; 28.6 Imp gallons).
ACCOMMODATION: Two persons side by side under enclosed canopy. Dual controls (sticks) standard. Baggage door on starboard side of fuselage aft of cockpit.

DIMENSIONS, EXTERNAL:

Wing span: Arrow	8.53 m (28 ft 0 in)
Arrow M/G	12.19 m (40 ft 0 in)
Length overall	5.79 m (19 ft 0 in)
Height overall (nosewheel)	1.83 m (6 ft 0 in)
Wheelbase	1.83 m (6 ft 0 in)
Propeller diameter	1.83 m (6 ft 0 in)

WEIGHTS AND LOADINGS:

Weight empty, typical	280 kg (617 lb)
Max T-O weight: Ultralight	544 kg (1,200 lb)
Certified	700 kg (1,543 lb)
Max power loading (prototype)	6.63 kg/kW (10.90 lb/hp)

PERFORMANCE (Subaru engine):

Max level speed	more than 200 kt (370 km/h; 230 mph)
Cruising speed at FL85	132 kt (244 km/h; 152 mph)
Stalling speed, flaps down	38 kt (71 km/h; 44 mph)
T-O and landing run	122 m (400 ft)
Range	782 n miles (1,448 km; 900 miles)
g limits	+10/-6

COBRA EXPLORER

TYPE: Side-by-side ultralight kitbuilt.
PROGRAMME: In February 2003, Cobra revealed it was building a prototype of a high-wing version of the Arrow, due to fly in the middle of that year. Strut-braced wings save 40 kg (88 lb) of structural weight. No further details revealed, although prototype structurally complete by mid-2003, and first flew on 16 August 2004. Data released in 2004 were identical to those for the Cobra Arrow.

COBRA LANDSEAIR

TYPE: Four-seat amphibian kitbuilt.
PROGRAMME: Designed by Martin Gischus; announced by Cobra in May 2003. Manufacture of tooling for prototype began in 2000. By early 2006 it was reported that the fuselage was complete and work on the wings was progressing.



Artist's impression of Cobra Landseair 0554412

COSTS: Kit AUD58,000 (2003).
POWER PLANT: One pusher piston engine. Options include 96.9 kW (130 hp) Subaru EA82, Rotax 914 and Jabiru 3300. Fuel capacity 100 litres (26.4 US gallons; 22.0 Imp gallons).

DIMENSIONS, EXTERNAL:

Wing span	10.06 m (33 ft 0 in)
Length overall	6.10 m (20 ft 0 in)

DIMENSIONS, INTERNAL:

Cabin max width	1.12 m (3 ft 8 in)
-----------------	--------------------

AREAS:

Wings, gross	15.79 m ² (171.0 sq ft)
--------------	------------------------------------

WEIGHTS AND LOADINGS:

Weight empty	350 kg (772 lb)
Max T-O weight	620 kg (1,366 lb)

PERFORMANCE:

Cruising speed	105 kt (194 km/h; 120 mph)
Stalling speed	40 kt (75 km/h; 46 mph)
Max rate of climb at S/L	244 m (800 ft)/min
T-O run on water	213 m (700 ft)
Landing run on water	244 m (800 ft)

DEAN-WILSON

DEAN-WILSON AVIATION LTD

PO Box 452 Kingaroy, QLD 4610
Tel: (+61 7) 41 60 41 60
e-mail: sales@dwaviation.com
Web: www.dwaviation.com
CHAIRMAN: Steve Wilson
VICE-CHAIRMAN: Gary Dean

Company was established in 2004 as an offshoot of the Dean-Wilson metal foundry. In the same year it announced that construction had begun of a new basic trainer designed by Bill Whitney, who had previously been responsible for refining the production version of Hughes Australian Lightwing; designing the Seabird Seeker; and 16 other projects. Dean-Wilson Aviation became a public listed company on 1 December 2005.
The new trainer, known as the Whitney Boomerang, is undergoing flight trials conducted by Arena Aviation at Kingaroy, north-west of Brisbane, and is being manufactured in series at the same location. Official opening of the 1,100 m² (11,850 sq ft) Kingaroy production facility was on 2 September 2006.



Dean-Wilson Whitney Boomerang 1154756

DEAN-WILSON WHITNEY BOOMERANG

TYPE: Two-seat lightplane.
PROGRAMME: Announced 2004, when construction of prototype was under way; this exhibited, partly complete, at Australian International Air Show at Avalon, 15 to 20 March 2005. First flight (VH-AAV) 6 July 2006. Delivery of first two production aircraft scheduled for March and April 2007 to launch customer, Arena Aviation.
CUSTOMERS: By January 2007, contracts received from training schools, Arena Aviation at Kingaroy and Minovation Flying School at Jandakot, Western Australia.
COSTS: USD129,000 basically equipped (2007).



Dean-Wilson Whitney Boomerang 1154687

DESIGN FEATURES: Low-cost, all-metal, basic trainer intended to replace Cessna 150/152, Piper PA-38 Tomahawk and similar aircraft. Design goals included strength, durability, comfort, good visibility for pilots, good performance and handling and incorporation of advanced technology.
Modular design for ease of production and maintenance; low-mounted, constant-chord wing; mid-mounted tailplane and sweptback fin with fillet.
Fatigue life 19,500 hours. Intended for CASA Type 23 certification.

FLYING CONTROLS: Conventional and manual. Balanced ailerons; horn/mass-balanced elevator and rudder. Slotted flaps; max deflection 45°. Control actuation by cables; pushrods for flaps.

STRUCTURE: Metal. Tubular 4130 steel cockpit cage with 6061-T6 aluminium cladding. Aluminium monocoque rear fuselage, except for steel tube framework anchorage for tailplane and single-piece elevator. Single-spar metal wing and control surfaces.

LANDING GEAR: Tricycle type; fixed. Wing-mounted spring cantilever mainwheel legs; oleo-pneumatic nosewheel leg. Mainwheels and nosewheel 5.00-5; hydraulic disc brakes on mainwheels. Parking brake. Nosewheel steerable.

POWER PLANT: One 85.8 kW (115 hp) Textron Lycoming O-235-N2C flat-four driving a metal, two-blade, fixed-pitch propeller. Optionally, one 119 kW (160 hp) Textron Lycoming O-320 flat-four. Fuel in two wing tanks, combined capacity 140 litres (37.0 US gallons; 30.8 Imp gallons).

ACCOMMODATION: Two persons, side by side, with baggage area at rear. Fixed windscreen; forward-hinged door each side; rear quarterlights for all-round vision. Dual controls.

SYSTEMS: Electric system, 12 V 60 A DC.

AVIONICS: Option of VFR, night VFR and IFR, including ADF and transponder.
Comms: Garmin GMA 340 intercom; GTX 327 transponder; GNS 430 COM/NAV/GPS.
Flight: Bendix/King KR 87 ADF and KI 227 indicator.

DIMENSIONS, EXTERNAL:

Wing span	9.80 m (32 ft 1 3/4 in)
Wing chord, constant	1.40 m (4 ft 7 in)
Wing aspect ratio	7.0
Length overall	6.46 m (21 ft 2 1/4 in)

Height overall	2.49 m (8 ft 2 in)
Tailplane span	2.95 m (9 ft 8 in)
Doors (each): Height	0.91 m (3 ft 0 in)
Width	0.65 m (2 ft 1¾ in)
Propeller diameter	1.83 m (6 ft 0 in)
DIMENSIONS, INTERNAL:	
Cockpit max width	1.12 m (3 ft 8 in)
AREAS:	
Wings, gross	13.72 m² (147.7 sq ft)
Ailerons (total)	1.22 m² (13.09 sq ft)
Flaps (total)	1.83 m² (19.74 sq ft)
Tailplane	1.31 m² (14.10 sq ft)
Elevator	0.90 m² (9.67 sq ft)

WEIGHTS AND LOADINGS:	
Max baggage weight	35 kg (77 lb)
Max T-O weight	750 kg (1,653 lb)
Max wing loading	54.7 kg/m² (11.20 lb/sq ft)
Max power loading	8.75 kg/kW (14.37 lb/hp)
PERFORMANCE:	
Never-exceed speed (V _{NE})	142 kt (263 km/h; 163 mph)
Cruising speed	95 kt (176 km/h; 109 mph)
Stalling speed: flaps up	49 kt (91 km/h; 57 mph)
flaps down	43 kt (80 km/h; 50 mph)
Endurance, absolute	5 h
g limits	+4.0/-2.2

FOXCON

FOXCON AVIATION AND RESEARCH PTY LTD

291 Gormley's Road, Seaforth, Mackay, Queensland 4741
Tel/Fax: (+61 7) 49 59 02 52
e-mail: foxcon@mrbean.net.au
Web: www.foxcon.com
DIRECTOR: Helmut Kley

Mr Kley redesigned the original Terrier lightplane and returned it to production in composites form, manufactured by his company, Foxcon, formed in 1995. Builders are able to participate in a factory-assistance programme.

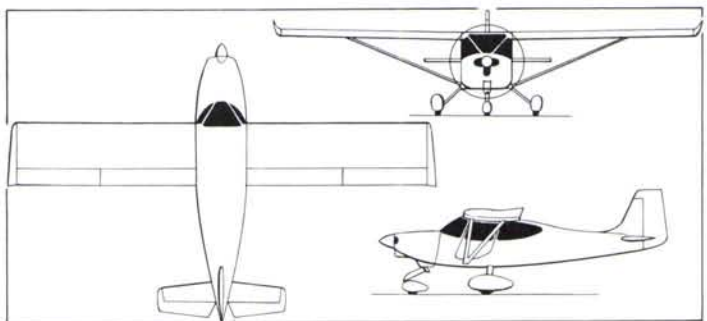
FOXCON TERRIER 200

TYPE: Side-by-side ultralight kitbuilt.
PROGRAMME: Composites version of 1980s tailwheel design, re-engineered, via Terrier 100, by Foxcon.
CURRENT VERSIONS: **Terrier 200:** As described.
Terrier 200C: Camper version; reconfigurable interior, with bench seat foldable to accommodate two recumbent occupants.
CUSTOMERS: Following some six of original version, 48 built by early 2005 including 30 in Australia, 10 in New Zealand (six currently registered) and one in Russia.
COSTS: Kit AUD55,000, including engine and tax (2005).
DESIGN FEATURES: High, constant-chord wing with streamlined V-strut bracing and upturned tips. Low tailplane and sweptback fin.
Quoted build time 300 hours, including builder-assistance programme.
Wing section Chris Mk 4, Dihedral 1° 30'.
FLYING CONTROLS: Conventional and manual. Frise ailerons with external hinge; horn-balanced elevators and rudder. Slotted flaps. Trim tabs on rudder and port ailerons; flight-adjustable tabs in both elevators. Control surface movements: ailerons +24/-12°; elevators +30/-20°.



Foxcon Terrier 200C camper version (Paul Jackson)

1151730



Foxcon Terrier two-seat ultralight (James Goulding)

1121715

STRUCTURE: Generally of vacuum-moulded composites with epoxy foam sandwich and steel fittings and firewall. Aluminium wing bracing struts.
LANDING GEAR: Tricycle type; fixed. Fuselage-mounted spring chromoly steel tube mainwheel legs with folded composites sheet streamlining; trailing link nosewheel. Hydraulic mainwheel brakes. Mainwheel size 16-inch; nosewheel 15-inch; composites wheel fairings on all.
POWER PLANT: One 74.6 kW (100 hp) Subaru EA 81 flat-four driving a Polyprop three-blade, ground-adjustable pitch, carbon fibre propeller via a Foxcon 2.2:1 belt drive with fore and aft bearings on each spindle. Optional Foxcon independent ignition system for each cylinder. Fuel tanks in wings, total usable capacity 80 litres (21.1 US gallons; 17.6 Imp gallons).
DIMENSIONS, EXTERNAL:
Wing span 8.82 m (28 ft 1¼ in)
Length overall 6.10 m (20 ft 0¼ in)
Height overall 2.38 m (7 ft 9¾ in)
WEIGHTS AND LOADINGS:
Weight empty 334 kg (736 lb)
Max baggage weight 30 kg (66 lb)
Max T-O weight 544 kg (1,200 lb)
PERFORMANCE:
Max level speed 120 kt (222 km/h; 138 mph)
Cruising speed 110 kt (204 km/h; 127 mph)
Stalling speed, flaps down 30 kt (56 km/h; 35 mph)
Max rate of climb at S/L 457 m (1,500 ft)/min
T-O and landing run 100 m (330 ft)
Range 600 n miles (1,111 km; 690 miles)
g limits +6/-4

GIPPSLAND

GIPPSLAND AERONAUTICS PTY LTD

Latrobe Regional Airport, Airfield Road, Traralgon, PO Box 881, Morwell, Victoria 3840
Tel: (+61 3) 51 72 12 00
Fax: (+61 3) 51 72 12 01
e-mail: sales@gippsaero.com
Web: www.gippsaero.com
DIRECTORS:
George Morgan
Peter Furlong
SALES CO-ORDINATOR: Marguerite Morgan

Involved since 1971 in design and modification programmes for a wide range of aircraft, from wooden homebuilts to pressurised turboprops. Conversion of five Piper Pawnees to two-seat configuration in second half of 1980s led eventually to a totally new design, the GA200 crop-sprayer. Second Gippsland aircraft, GA8 Airvan, first flew in 1995 and was delivered to customers from December 2000 onwards. First export Airvan flew in 2001.

Other activities include main spar life extension of Piper Navajo/Chieftain, of which 83 had been refurbished by February 2006.

In early 2006, Gippsland occupied 6,000 m² (64,575 sq ft) of factory area; personnel totalled 115.

GIPPSLAND GA200 FATMAN

TYPE: Agricultural sprayer.
PROGRAMME: Precursor was two-seat conversion of five Piper PA-25-235 Pawnees to -235/A8 or -235/A9 Fatman standard in 1986-90. Prototype GA200 (VH-BCE) registered 1991; this and second aircraft used airframes from damaged Pawnees; No 3 (VH-SKG) was first new-build, in 1992. Designation derived from hopper capacity in US gallons. Full Australian CAA certification in both Normal and Agricultural categories (to CAO 101.16

and 101.22 and FAR Pt 23 Amendment 23.36) awarded 1 March 1991; FAR Pt 23 certification awarded 15 October 1997 in Restricted category. Certification also achieved in Brazil, Canada, China, New Zealand, South Africa and the US. Production at Traralgon, Victoria, since 1993, but now available to special order only. Is promoted in Middle East by Seabird Aviation Jordan, which offered new-build aircraft to Kurdistan government in 2005 under manufacturing licence granted by Gippsland.

CURRENT VERSIONS: **GA200:** Initial version; 194 kW (260 hp) Textron Lycoming O-540-H2A5 engine. Hopper capacity 776 litres (205 US gallons; 170 Imp gallons). Replaced by GA200C.

GA200 Ag-trainer: Training version, with dual controls, dual rudder pedals and smaller hopper. Total of three built, plus unspecified number of conversions from GA200s.

GA200B: Unofficial designation of GA200 with extended wingtips. Most built up to 1998 were to this standard.

GA200C: As described. Up-rated (224 kW; 300 hp IO-540-K1A5) engine beneath cowling of revised shape; constant-speed propeller; 1,050 litre (277.4 US gallon; 231 Imp gallon) hopper capacity. In early 1998, 21st production (23rd overall) aircraft completed as prototype GA200C; all subsequent aircraft to this standard. Textron Lycoming AEIO-580 of 246 kW (330 hp) installed in new-built 45th aircraft and first flown 11 February 2003 for engine evaluation.

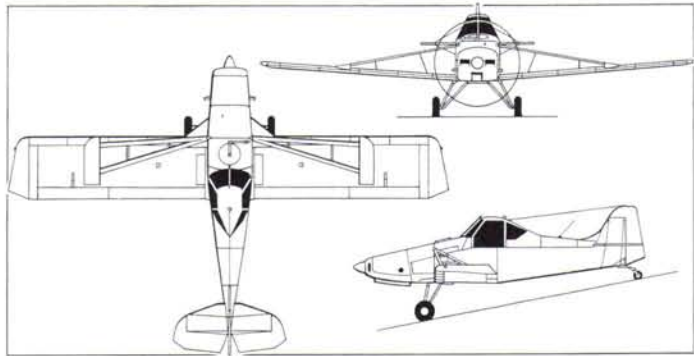
CUSTOMERS: Delivery of 44th (including prototypes) effected in November 2001; 45th flown February 2003; none further by end of that year. Exports to Brazil (one), Canada (one), China (nine), New Zealand (eight, beginning 1994), South Africa (two) and USA (five).
COSTS: USD470,483 ex-Jordan (2005).

DESIGN FEATURES: Purpose-designed agricultural aircraft. Braced low wing, with large integral hopper forward of cockpit; leading-edges are not handed to minimise replacement time in the event of birdstrike or other minor damage; crash-resistant, corrosion-proofed structure; gap-sealed ailerons; detachable wingtips. Although initially based on Piper Pawnee, GA200 in current form is substantially different. Wing dihedral 7° from roots. Flaps and ailerons non-handed. Horn-balanced elevators and rudder.



Gippsland GA200 Fatman agricultural sprayer

1151718



Gippsland GA200C Fatman sprayer (Mike Keep)

0110575

FLYING CONTROLS: Conventional and manual, cable actuated. Single-slotted trailing-edge wing flaps can be deployed to tighten turning radius during agricultural operations; T-O setting 15°, maximum 38°. Interconnect system applies bias to elevator trim spring when flaps extended, to avoid pitch trim changes. Fixed tab on rudder. Gap-sealed ailerons to prevent chemical ingress.

STRUCTURE: Fuselage of welded SAE 4130 chromoly steel tube with removable metal side and top panels; wings (braced by overwing inverted V strut of aluminium each side) and wire-braced tail surfaces conventional all-metal, but wing spars constructed from sheet metal to expedite repairs; wingtips detachable. Rear fuselage and tail surfaces are fabric covered. Initial fatigue life of 15,000 hours set by CASA, subject to extension pending ongoing tests.

LANDING GEAR: Non-retractable, with 6 in diameter Cleveland P/N 40-84A mainwheels mounted on tubular steel side Vs, hinged to lower longerons, plus half-axes under centreline, each with bungee cord shock-absorber, and hydraulic dampers; wire-cutter on leading tube of landing gear legs; Cleveland heavy duty hydraulic disc brakes. Mainwheel tyres size 8.50x6 (6 ply), Scott 3200 steerable/castoring tailwheel, size 5.00-5 (4 ply) mounted on multileaf flat springs.

POWER PLANT: One 224 kW (300 hp) Textron Lycoming IO-540-K1A5 flat-six engine, driving a Hartzell HC-C2YR-1BF/F8475R constant-speed, two-blade metal propeller. AEIO-580 installation under test in 2003, offering additional 22 kW (30 hp). Fuel in integral tank in each wing, combined usable capacity 200 litres (52.8 US gallons; 44.0 Imp gallons), plus small 14 litre (3.7 US gallon; 3.1 Imp gallon) header tank in upper front fuselage. Oil capacity 11.4 litres (3.0 US gallons; 2.5 Imp gallons).

ACCOMMODATION: Two energy-absorbing seats, side by side (smaller, right-hand seat for loader/driver); dual controls and second set of rudder pedals for right-hand seat in Ag-trainer. Four-point 25 g restraint harness(es). Cockpit doors open upward, each with bulged window to improve shoulder room and outward view. Pressurisation system minimises dust and chemical ingress.

SYSTEMS: 14 V 95 A automotive alternator and automotive or R-35 aviation battery for electrical power; 50 A circuit breaker switch serves as master switch.

AVIONICS: *Instrumentation:* ASI, electric turn-and-bank indicator, altimeter, tachometer, oil temperature and pressure gauges, CHT gauge, ammeter, fuel flow gauge and totaliser, and EGT gauge, all standard, VHF com only.

EQUIPMENT: One 1,070 litre (283 US gallon; 235 Imp gallon) capacity glass fibre/vinyl ester hopper in forward fuselage (approximately 76 litres; 20.0 US gallons; 16.7 Imp gallons less in Ag-trainer), with minimum load dump time of five seconds. Multirole door/hopper outlet, eliminating need to change outlet when changing between solids and liquids, can also be used for fire bombing or laying of fire retardants. Spreader vanes can be added to increase swath width. Cable cutters on landing gear legs and windscreen. 100 W landing light in each wingtip; 28 V night working lights system (two retractable underwing 600 W lights, powered by separate 28 V 55 A alternator) also available.

DIMENSIONS, EXTERNAL:

Wing span, standard version	11.985 m (39 ft 3¾ in)
Wing chord, constant	1.60 m (5 ft 3 in)
Wing aspect ratio	7.3
Length overall (flying attitude)	7.48 m (24 ft 6½ in)
Height (static) over cockpit canopy	2.33 m (7 ft 7¾ in)
Tailplane span	2.90 m (9 ft 6¼ in)
Wheel track	2.335 m (7 ft 8 in)
Propeller diameter	2.13 m (7 ft 0 in)

AREAS:

Wings, gross	19.59 m² (210.9 sq ft)
Ailerons (total)	0.79 m² (8.49 sq ft)
Flaps (total)	0.71 m² (7.63 sq ft)
Fin	0.48 m² (5.155 sq ft)
Rudder, incl tab	0.63 m² (6.76 sq ft)
Tailplane	1.295 m² (13.92 sq ft)
Elevators (total)	1.37 m² (14.725 sq ft)

WEIGHTS AND LOADINGS:

Weight empty	758 kg (1,671 lb)
Operating weight empty	868 kg (1,914 lb)
Max hopper capacity, Normal category	544 kg (1,199 lb)
Max T-O weight: Normal category	1,524 kg (3,359 lb)
Agricultural category	1,996 kg (4,400 lb)
Max landing weight	1,448 kg (3,192 lb)
Max wing loading	101.8 kg/m² (20.86 lb/sq ft)
Max power loading	8.91 kg/kW (14.64 lb/hp)

PERFORMANCE:

Never-exceed speed (VNE)	144 kt (266 km/h; 165 mph)
Max cruising speed at 75% power	115 kt (213 km/h; 132 mph)
Ferry speed	110 kt (204 km/h; 127 mph)
Econ cruising speed	100 kt (185 km/h; 115 mph)
Stalling speed: flaps up	57 kt (106 km/h; 66 mph)
flaps down	51 kt (95 km/h; 59 mph)
Max rate of climb at S/L	149 m (490 ft)/min
T-O run, normal category	350 m (1,148 ft)
T-O to 15 m (50 ft), normal category	475 m (1,558 ft)
Landing from 15 m (50 ft)	360 m (1,181 ft)
Landing run	200 m (656 ft)
Max range	400 n miles (740 km; 460 miles)
g limits	+3.8/-1.52

GIPPSLAND GA8 AIRVAN

TYPE: Light utility transport.

PROGRAMME: Design completed and proof of concept prototype construction started early 1994; first flight 3 March 1995 (aircraft then marked only as 'GA-8' on the fin but allocated company test registrations VH-GAV and later VH-PTR); 186 kW (250 hp) Textron Lycoming O-540; prototype destroyed 7 February 1996 during spinning trials; second airframe completed to major component stage for static testing; third airframe (initially flown without test registration VH-ZGI but with 'AIRVAN' on fin was second flying prototype, first flown in August 1996 with an interim 224 kW (300 hp) Textron Lycoming IO-540K-1A5 engine and three-blade propeller, pending installation of intended (but temporarily discontinued) production standard IO-580 in 1997; total of 350 hours flight testing completed by two prototypes by November 1998; second prototype re-registered VH-XGA in January 1999.

Provisional type certification obtained 10 March 1999, with full CASA certification to FAR Pt 23 Amendment 48 achieved 10 October 2000; subsequently upgraded to FAR Pt23 Amendment 54 on 14 March 2003, this applicable to c/n 026 (VH-HQE) and upwards, but earlier aircraft are upgradable. First delivery (VH-RYT) to Air Fraser Island Air 22 December 2000. Initial export aircraft (seventh overall, c/n 008/V3-HGI) first flew 24 November 2001, and delivered to Maya Island Air of Belize in following month. International debut (VH-BJY) at Asian Aerospace show in Singapore February 2002 before delivery to distributor PT Airvan Dirgantara of Indonesia. Transport Canada certification achieved in April 2003, followed by FAA FAR Pt23 Amendment 54 approval 30 May 2003; UK certification (for EASA) achieved 29 July 2005.

Various upgrades under development by 2005, principal being turbocharged TIO-540 engine (initial customer Mission Aviation Fellowship); trial installation in converted early production aircraft (VH-TBU) first flown November 2004; available in 2006. Turbine engine test programme to follow, but Diesel project awaiting certification of suitable engine. Other upgrades include enlarged nosewheel option; 'winterisation' with engine-powered heaters and door seal; Wipaire 4000 float option in conjunction with TIO-540 engine; skis; and Honeywell autopilot (available 2006); medical evacuation interior. Airvan VH-FGN used as testbed for outstanding upgrades in 2005-06; certification of these was expected in late 2006.

CUSTOMERS: Total of 84 production aircraft completed by February 2006. Deliveries included four in 2001; 12 in 2002; 19 in 2003; 23 in 2004; and 26 in 2005. Exports include aircraft for Belize (Maya Island Air, two), Botswana (three), Canada (two), Costa Rica (three), Germany (one, Ostfriesische Luft Transport), Indonesia (six), Lesotho Defence Force (one c/n 03-038/LDF-54 delivered 19 March 2004), Mozambique (two), New Zealand (six), New Caledonia (one), Papua New Guinea (one), South Africa (eight), United Kingdom (two, including Boogie Club Skydive Centre), and US (22). Australian customers include Air Fraser Island (three), Alligator Airways (two), Lanya Air (three), Kakadu AirServices (two), Latrobe Air (one), Missionary Aviation Fellowship Australia (one), Shine Aviation Services (one), Skydive Oz (one), TGS Air Charter (two), and Wrightsair (three). In January 2003, the US Civil Air Patrol appointed Gippsland to supply Airvans on an Indefinite Quantity Indefinite Delivery (IQID) basis over a three-year period. The first CAP Airvan, c/n 030 (VH-AUP/N605CP), was delivered in August 2003 for SAR and Homeland Security missions; total 16 supplied by late 2005.

COSTS: US\$450,000, VFR equipped (2006).

DESIGN FEATURES: Strut-braced, high-wing monoplane with sweptback vertical tail and fixed tricycle landing gear; designed to operate from unprepared strips. Fin and rudder modified, and ventral finlet added on second prototype, late 1996.

Wing aerofoil modified US 35B; dihedral 2° 30'; incidence 2°; twist 1.6°.

FLYING CONTROLS: Conventional and manual. Trimmable tailplane, deflections +2°/-5°; slotted flaps, deflections 14 and 38°. Elevator deflections +15°/-19°; ailerons +17°/-16°; rudder ±21°.

STRUCTURE: Light alloy; two-spar wing based on GA200 Fatman unit; composites cowlings and fairings; entire structure designed for easy manufacture, maintenance and repair.



Gippsland GA8 Airvan (Textron Lycoming IO-540 engine) (James Goulding)

0110574



Gippsland Airvan Australian owned (Paul Jackson)

1151694



Gippsland Airvan delivered to Mission Aviation Fellowship in early 2005, complete with new ventral pannier (Paul Jackson)

1121704

LANDING GEAR: Non-retractable tricycle type; single-piece tubular spring main gear, steerable steel spring/oleo nose leg; Parker heavy duty hydraulic disc brakes; high flotation mainwheels 8.50-6 (6 ply); nosewheel 6.00-6 (6 ply). Wipline float installation under development in US.

POWER PLANT: One 224 kW (300 hp) Textron Lycoming IO-540-K1A5 flat-six engine driving a two-blade Hartzell HC-2YR-1BF/F8475R constant-speed propeller. Fuel capacity 340 litres (89.8 US gallons; 74.8 Imp gallons) in two wing tanks, of which 332 litres (87.7 US gallons; 73.0 Imp gallons) usable. Oil capacity 11 litres (3.0 US gallons; 2.5 Imp gallons).

ACCOMMODATION: Pilot and up to seven passengers or equivalent cargo; full FAR Pt 23.562 compliant crashworthy seats. Amsafe seatbelt airbags under development in early 2003. Crew door each side of flight deck; flight openable forward-sliding cargo door on port side aft of wing. Cabin is heated and ventilated. Baggage compartment, with security net, at rear of cabin. Optional ventral cargo pod certified October 2004 and first fitted to VH-MFE (c/n 065), flown 21 December 2004.

SYSTEMS: Split bus electrical system powered by 14 V 95 A engine-driven alternator. Maintenance-free sealed battery and external power receptacle with overvolt protection standard.

AVIONICS: Standard Bendix/King avionics suite.

Comms: Dual KY 97A-61 VHF; KT 76A-12 transponder; KMA 24H audio panel and TX4400 intercom; pilot's yoke-mounted PTT switch; pilot's and co-pilot's headsets and microphone jacks.

Flight: KR 87 digital ADF; altitude encoder.

Instrumentation: KMD 150 moving map with 102 × 76 mm (4 × 3 in) multifunction display, airspeed indicator, artificial horizon, altimeter with hectoPascal subscale, electric turn co-ordinator, directional gyro, vertical speed indicator, OAT gauge, internally lit magnetic compass, electronic digital fuel flow and totaliser gauge, EGT gauge, recording tachometer, fuel supply gauge, fuel gauges with low fuel warning lights, oil temperature/pressure gauges, CHT gauge, and manifold pressure gauge.

EQUIPMENT: Standard equipment includes automatic fuel management system, windscreen demisting, instrument panel lighting, avionics dimming, map and cabin reading lights, navigation lights, dual landing/taxying lights, dual wingtip strobe lights; external power receptacle; pilot's and co-pilot's five-point inertia reel shoulder harnesses; six three-point inertia reel harnesses for passengers; cabin soundproofing; and entrance step.

DIMENSIONS, EXTERNAL:

Wing span 12.41 m (40 ft 8¾ in)

Wing chord, constant 1.60 m (5 ft 3 in)

Wing aspect ratio	7.9
Length overall	8.95 m (29 ft 4¼ in)
Fuselage max width	1.37 m (4 ft 6 in)
Height overall	3.89 m (12 ft 9 in)
Tailplane span	4.17 m (13 ft 8 in)
Wheel track	2.79 m (9 ft 2 in)
Wheelbase	2.30 m (7 ft 6½ in)
Cargo/passenger door: Height	1.08 m (3 ft 6½ in)
Width	1.07 m (3 ft 6 in)
Height to sill	0.85 m (2 ft 9½ in)
Propeller diameter	2.13 m (7 ft 0 in)
DIMENSIONS, INTERNAL:	
Cabin: Length, incl flight deck	3.96 m (13 ft 0 in)
Max width	1.27 m (4 ft 2 in)
Max height	1.19 m (3 ft 11 in)
Max headroom, seat to ceiling	0.84 m (2 ft 9 in)
Floor area: incl flight deck	5.02 m² (54.0 sq ft)
excl flight deck	3.44 m² (37.0 sq ft)
Volume, incl flight deck	5.1 m³ (180 cu ft)
Cargo pod volume	0.51 m³ (18.0 cu ft)
AREAS:	
Wings, gross	19.32 m² (208.0 sq ft)
Ailerons (total)	1.60 m² (17.20 sq ft)
Trailing-edge flaps (total)	1.60 m² (17.20 sq ft)
Fin	1.90 m² (20.50 sq ft)
Rudder	0.77 m² (8.30 sq ft)
Tailplane	4.40 m² (47.40 sq ft)
Elevators (total)	1.76 m² (18.90 sq ft)
WEIGHTS AND LOADINGS:	
Weight empty	997 kg (2,198 lb)
Baggage capacity: shelf	113 kg (250 lb)
aft bin	23 kg (50 lb)
Cargo pod capacity	200 kg (441 lb)
Max fuel	248 kg (547 lb)
Max T-O and landing weight:	
initial certification	1,814 kg (4,000 lb)
target	1,905 kg (4,200 lb)

Max wing loading:	
initial certification	93.9 kg/m ² (19.23 lb/sq ft)
target	98.6 kg/m ² (20.19 lb/sq ft)
Max power loading:	
first prototype	9.74 kg/kW (16.00 lb/hp)
initial certification	8.12 kg/kW (13.33 lb/hp)
target	8.52 kg/kW (14.00 lb/hp)
PERFORMANCE:	
Never-exceed speed (VNE)	185 kt (342 km/h; 212 mph)
Normal cruising speed at 3,048 m (10,000 ft)	120 kt (222 km/h; 138 mph)
Econ cruising speed	104 kt (193 km/h; 120 mph)
Stalling speed: flaps up	60 kt (112 km/h; 69 mph)
flaps down	52 kt (97 km/h; 60 mph)

Max rate of climb at S/L	240 m (787 ft)/min
Service ceiling, estimated	6,100 m (20,000 ft)
T-O run	347 m (1,138 ft)
T-O to 15 m (50 ft)	457 m (1,500 ft)
Landing from 15 m (50 ft)	396 m (1,300 ft)
Landing run	155 m (509 ft)
Range with max fuel:	
normal cruise	730 n miles (1,352 km; 840 miles)
econ cruise	933 n miles (1,727 km; 1,073 miles)
Endurance, no reserves:	
at normal cruising speed	6 h
at econ cruising speed	9 h

GOAIR

675 Drover Road, Bankstown Airport, New South Wales 2200
Tel: (+61 2) 97 96 34 26
Fax: (+61 2) 97 91 03 54
e-mail: goair@bigpond.com
MANAGING DIRECTOR: Phil Goard

Company machines, welds and manufactures aircraft components. During the 1990s it designed, built and flight-tested the Goair Trainer, production of which was begun, although does not appear to have progressed.
In 2001, Goair completed a replica of the 1920s Westland Widgeon. Company re-formed as PG Aviation Pty Ltd.

HUGHES

HOWARD HUGHES ENGINEERING PTY LTD
PO Box 89, Lot 8, Southern Cross Drive, North Ballina, New South Wales 2478
Tel: (+61 2) 66 86 86 58
Fax: (+61 2) 66 86 83 43
e-mail: al@spot.com.au
Web: www.lightwing.com.au
MANAGING DIRECTOR: Howie Hughes
SECRETARY: Jenny Hughes
PRODUCTION MANAGER: Nick Hughes
PUBLIC RELATIONS MANAGER: Shelly Hughes

Company formed 1984 to design and produce the Australian LightWing series which has developed from GR-582 via GA-55 to GR-912 and the associated Sport 2000. Most production, undertaken in a 2,000 m² (21,525 sq ft) factory at Ballina Airport, is for local use and either full certification or registry under AUF rules; around 10 aircraft per year are built. Aircraft for export are issued with Australian certificates of airworthiness. In 2003, the company announced the LightWing Speed, a low-wing development of the GR-912 family. By end 2004, over 160 aircraft had been produced, while the new Lightwing Speed made its first flight in 2005. In early 2005, the workforce numbered seven.

DIMENSIONS, EXTERNAL:	
Wing span	9.50 m (31 ft 2 in)
Length overall	5.68 m (18 ft 7½ in)
Height overall	1.90 m (6 ft 2¼ in)
AREAS:	
Wings, gross	15.35 m ² (165.2 sq ft)
WEIGHTS AND LOADINGS:	
Weight empty	295 kg (650 lb)
Max T-O weight: on wheels	544 kg (1,199 lb)
on floats	620 kg (1,366 lb)
certified	480 kg (1,058 lb)
PERFORMANCE:	
Max level speed	95 kt (176 km/h; 109 mph)
Max cruising speed	80 kt (148 km/h; 92 mph)
Loiter speed	50 kt (93 km/h; 58 mph)
Stalling speed, full flaps, power off	40 kt (74 km/h; 46 mph)
Max rate of climb at S/L	244 m (800 ft)/min
T-O run	100 m (330 ft)
Landing run	80 m (263 ft)
Range with max fuel	216 n miles (400 km; 248 miles)

HUGHES AUSTRALIAN LIGHTWING GR-912

TYPE: Side-by-side ultralight/kitbuilt.
PROGRAMME: Prototype Australian LightWing (ALW) (25-0032) made first flight June 1986; initially with 47.8 kW (64.1 hp) Rotax 582 UL; many sold conforming to CAO 95 Pt 25 requirements; also produced under homebuilt or CAO 101 Pt 28 regulations in non-retractable tailwheel and twin-float configurations; first amphibian model delivered in 1990. Type certificate issued 25 September 1998.
CURRENT VERSIONS: **GR-912:** Tailwheel version. As described.
GR-912-T: Tricycle landing gear version; marketing designation Sport 2000; described separately.
LightWing Truck: Added to range in 2002; uses same wing married to 45 cm (1 ft 5¾ in) longer fuselage with extra space behind seats able to accommodate two further seats; reinforcing has obviated need for wire bracing on tail unit. Cabin width increased by 15 cm (6 in). Powered by 84.6 kW (113.4 hp) Rotax 914; will accept eight-cylinder 149 kW (200 hp) Jabiru once engine development completed. Initially offered in tailwheel configuration, with nosewheel version offered from 2003.
CUSTOMERS: More than 160 aircraft (all versions) delivered by end 2004; over 90 per cent registered under AUF rules. Claimed 29 per cent share of Australian two-seat light trainer market with GR-912.
COSTS: GR-912 AUD85,900 factory built; flaps AUD2,000 extra (2006).
DESIGN FEATURES: Modified Clark Y wing section. Quoted build time 500 hours, which reduces to 300 hours with quick-build versions.
FLYING CONTROLS: Conventional and manual. Optional flaps.
STRUCTURE: Strut-braced metal wings; welded 4130 steel tube fuselage and tail; tail surfaces are wire-braced; composites and polyfibre covering.
LANDING GEAR: Tailwheel type; fixed. Optional amphibious floats with retractable mainwheels and non-retractable tailwheels (latter doubling as water rudders).
POWER PLANT: One 73.5 kW (98.6 hp) Rotax 912 ULS flat-four driving a two- or three-blade propeller via 2.27:1 gear reduction; Aerofiber wooden two-blade fixed-pitch propeller recommended; can also be fitted with 59.6 kW (79.9 hp) Rotax 912UL. Fuel capacity 60 litres (15.8 US gallons; 13.2 Imp gallons) of which 57 litres (15.1 US gallons; 12.5 Imp gallons) are usable. Oil capacity 3.0 litres (0.8 US gallon; 0.7 Imp gallon).

HUGHES AUSTRALIAN LIGHTWING SPEED

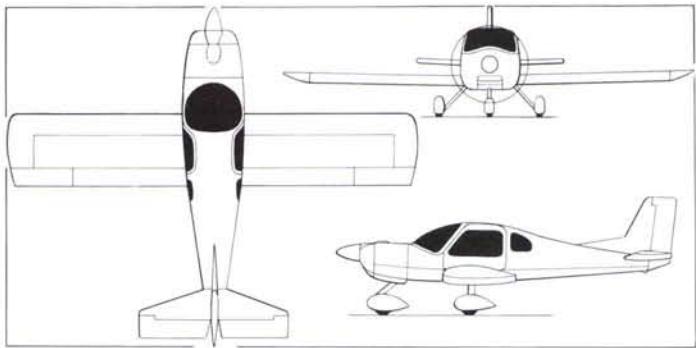
TYPE: Side-by-side ultralight/kitbuilt; four-seat kitbuilt.
PROGRAMME: Design began in 2002; construction started in 2003. Prototype (19-4353) first flew 19 July 2005, powered by Rotax 912S engine and Bolly propeller. Available as a kit for RAA or experimental categories from 2005 and factory-built from 2006.
CURRENT VERSIONS: **Speed 2000-S:** Two-seat Sport version; Rotax engine standard. Available only as kit; RAA (Australian) Ultralight category.
Speed 3000: Two-seat; Superior XP-360 engine. Kit only; experimental category.
Speed 4000: Four-seat version; larger wing; lowered 18 cm (7 in) cockpit floor at rear; Superior engine; Experimental category.
Speed GT: Glider Tug. Two-seat; large wing; Light Sport engine.
COSTS: Kit: Speed 2000-S AUD74,900 including Rotax 912S engine; Speed 3000 kit AUD79,000 and Speed 4000 AUD82,000, both with XP-360 engine; all plus tax (2006) and including 'glass' cockpit.
DESIGN FEATURES: Based on company's existing LightWing GR-912 family, including large fin fillet, but of low wing layout. Retains welded steel cockpit frame. Quoted build time 500 hours.
FLYING CONTROLS: Conventional and manual. Mass-balanced ailerons, plus horns on elevator and rudder. Ailerons and rudder actuated by pushrods; elevator by cables; three-position manual flaps as standard.
STRUCTURE: Fuselage of 4130 welded steel tube with glass fibre, semi-structural external shell, although Speed 2000 has fabric-covered lower rear fuselage to limit weight. Wings have aluminium spar; glass fibre ribs, leading-edge and tips; aluminium centre and rear skin. Control surfaces are mixture of glass fibre and 6061-T6 tube with fabric covering.
LANDING GEAR: Fixed; tricycle type standard; tailwheel type optional, but all aircraft have interchangeable fittings. Fuselage-mounted, spring tubular steel cantilever mainwheel legs with composites streamline fairings; nosewheel similar; optional wheel fairings. Mainwheels 6.00-6; nosewheel 5.00-5. Floats optional.
POWER PLANT: Options include Light Sport Power 220 (Subaru EJ22) turbocharged, geared flat-four rated at 164 kW (220 hp); Subaru EJ20 of 149 kW (200 hp) as converted by Hughes and with MOTEC engine management system. 134 kW (180 hp) Superior XP-360; 73.5 kW (98.6 hp) Rotax 912S or 84.6 kW (113.4 hp) Rotax 914 flat-four. LW 230



Hughes GR-582 operating from Yarrawonga 1037908



Hughes Australian Lightwing 2000-S prototype 1037913



Hughes Australian Lightwing Speed 2000-S (James Goulding) 1121596

liquid-cooled engine and 2.1:1 gearbox planned for later versions. Two- or three-blade propeller; fixed- or flight-adjustable pitch. Fuel capacity 180 litres (47.5 US gallons; 39.6 Imp gallons) in four integral wing tanks.

ACCOMMODATION: Gull-wing doors each side of fuselage. Sidestick controllers.

AVIONICS: *Instrumentation:* ‘Glass cockpit’ of Hughes design and integration as standard, including one 254 mm (10 in) touch-screen (optionally two) Lawrance Airmap GPS and Fugawie mapping software. Optional internet access system.

EQUIPMENT: Optional ballistic recovery parachute.

All data are provisional.

DIMENSIONS, EXTERNAL:	
Wing span: 2000, 3000	7.87 m (25 ft 9¾ in)
4000, GT	8.30 m (27 ft 2¾ in)
Length overall	6.42 m (21 ft 0¾ in)
Height overall	2.52 m (8 ft 3¼ in)
DIMENSIONS, INTERNAL:	
Cockpit max width	1.18 m (3 ft 10½ in)
AREAS:	
Wings, gross: 2000, 3000	11.81 m² (127.1 sq ft)
4000, GT	13.15 m² (141.5 sq ft)
WEIGHTS AND LOADINGS:	
Weight empty: 2000	400 kg (882 lb)
3000, GT	500 kg (1,102 lb)
4000	600 kg (1,323 lb)
Max T-O weight: 2000	600 kg (1,322 lb)
3000, GT	800 kg (1,763 lb)
4000	1,100 kg (2,425 lb)
PERFORMANCE:	
Normal cruising speed: 2000	115 kt (213 km/h; 132 mph)
3000	165 kt (306 km/h; 190 mph)
Stalling speed, flaps down	45 kt (84 km/h; 52 mph)
Service ceiling	3,050 m (10,000 ft)

HUGHES AUSTRALIAN LIGHTWING SPORT 2000

TYPE: Side-by-side ultralight/kitbuilt.

PROGRAMME: Developed version of GR-912 (which see); certified in Australian Primary category. Uses original LightWing type certificate.

CUSTOMERS: 10 built by end 2002.

COSTS: AUD88,900 factory built; AUD45,900 kit, including alternative 59.6 kW (79.9 hp) Werner engine (2005).

FLYING CONTROLS: Conventional and manual. Horn-balanced tail surfaces; elevator pushrod-operated; aileron and rudder cable-operated. Three-position flaps.

STRUCTURE: Welded steel tube fuselage; riveted aluminium alloy two-spar wings; mainly fabric covered, with non-structural glass fibre fairings.

LANDING GEAR: Tricycle type; fixed; steerable nosewheel. Two faired-in side Vs hinged to lower longerons, plus half-axes sprung under centreline. Mainwheels 152 mm (6 in); nosewheel 127 mm (5 in).



Hughes Australian LightWing Sport 2000 (Paul Jackson) 1121613



Hughes Australian LightWing Sport 2000, showing optional ‘Heliview’ cockpit with side window at floor height (Rotax 912 UL flat-four) (James Goulding) 0010201

POWER PLANT: One 59.6 kW (79.9 hp) Rotax 912 UL flat-four driving an Aerofiber two-blade fixed-pitch wooden propeller. Fuel capacity 62 litres (16.4 US gallons; 13.6 Imp gallons) in two wing tanks.

DIMENSIONS, EXTERNAL:

Wing span	9.50 m (31 ft 2 in)
Length overall	5.68 m (18 ft 7½ in)
Height overall	2.20 m (7 ft 2½ in)

AREAS:

Wings, gross	15.14 m² (163.0 sq ft)
--------------	------------------------

WEIGHTS AND LOADINGS:

Weight empty	300 kg (661 lb)
Max T-O weight	480 kg (1,058 lb)

PERFORMANCE:

Cruising speed at 75% power	72 kt (133 km/h; 83 mph)
Stalling speed	35 kt (65 km/h; 41 mph)
T-O to and landing from 15 m (50 ft)	300 m (985 ft)
Range with max fuel	300 n miles (555 km; 345 miles)
g limits	+6/-4

HUGHES POCKET ROCKET

TYPE: Tandem seat-ultralight/kitbuilt.

PROGRAMME: Launched in 2000.

CURRENT VERSIONS: **PR-582:** Rotax 582 engine; *as described*.

PR-Breeze: Single-seat Rotax 503 engine.

PR-Bipe: Biplane version, *described separately*.

CUSTOMERS: Some 20 sold by early 2005.

COSTS: PR Breeze: Kit AUD29,900, including engine, propeller, altimeter, ASI, fabric covering and white paint (2004).

DESIGN FEATURES: Narrow-fuselage version of earlier ALW designs. Quoted kit build time 400 hours.

FLYING CONTROLS: Conventional and manual.

STRUCTURE: Fabric-covered tubular steel fuselage and wings. Main spar constructed from 10 cm (4 in) diameter tubular steel.

LANDING GEAR: Tailwheel type; fixed. Two faired-in side Vs hinged to lower longerons, plus half-axes sprung under centreline. Optional wheel fairings on PR-582.

POWER PLANT: PR-582 has one 47.8 kW (64.1 hp) Rotax 582 liquid-cooled two-cylinder engine driving two-blade wooden propeller. PR-Breeze has one air-cooled, two-cylinder, 34.0 kW (45.6 hp) Rotax 503, also driving two-blade wooden propeller. Fuel capacity (both) 80 litres (21.1 US gallons; 17.6 Imp gallons) in two integral wing tanks.

ACCOMMODATION: Pilot and passenger in tandem; PR-Breeze accommodates pilot only, in open cockpit.

DIMENSIONS, EXTERNAL:

Wing span	7.30 m (23 ft 11½ in)
Length overall	5.60 m (18 ft 4½ in)

AREAS:

Wings, gross	9.29 m² (100.0 sq ft)
--------------	-----------------------

PERFORMANCE:

Never-exceed speed (VNE)	105 kt (194 km/h; 120 mph)
Normal cruising speed	75 kt (139 km/h; 86 mph)
Stalling speed, flaps down	40 kt (74 km/h; 46 mph)



Hughes PR-582 tandem-seat ultralight 1042706

HUGHES PR-BIPE

TYPE: Tandem-seat, ultralight biplane/kitbuilt.

PROGRAMME: Name reflects biplane version of Hughes Pocket Rocket; wing span 6.00 m (19 ft 8¼ in). Offered from 2003. Prototype (19-4080) made first flight 10 July 2004. Further two under construction in 2005. Quoted build time 500 hours.

COSTS: Kit AUD34,990 (2005).



Hughes PR-Bipe tandem-seat ultralight 1042709

INTEGRITY

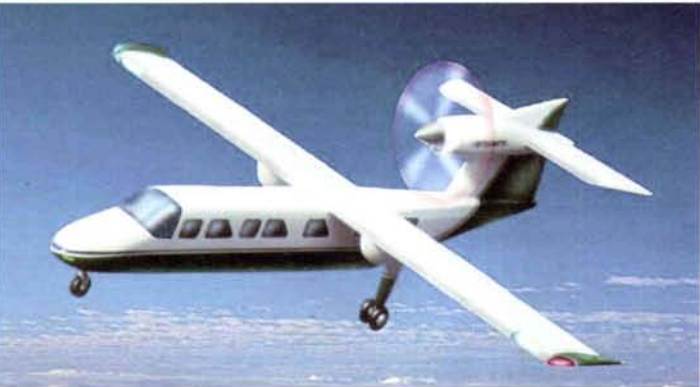
INTEGRITY AIRCRAFT
PO Box 77, West Lindfield, New South Wales 2070
Tel: (+61 2) 94 99 40 20
Fax: (+61 2) 94 99 40 21
e-mail: kbm.int@bigpond.com
OWNER AND MANAGER: Lance H Watson

In May 2003, Mr Watson gave evidence to the Australian House of Representatives Transport & Regional Services Committee hearings, which included details of his company's intention to develop a single-turboprop version of Britten-Norman Trislander able to serve remote communities at "bus fare prices".
Construction of a prototype was to have begun in 2006.

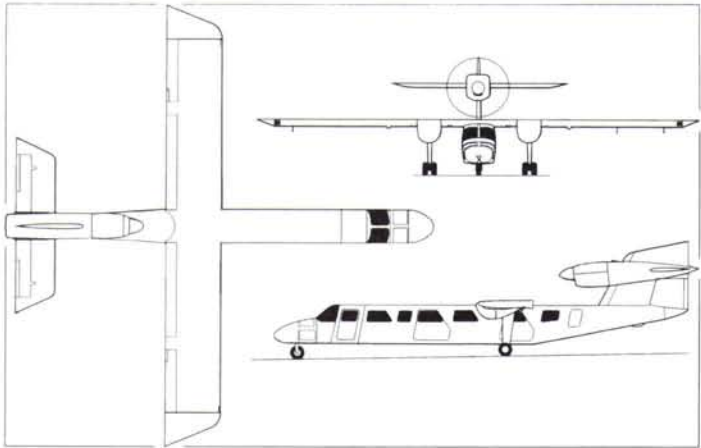
INTEGRITY INTEGRITY

TYPE: Light utility turboprop.
PROGRAMME: Under development since 1999. Manufacture due to have begun in early 2005, but final details for funding were only being negotiated in January 2006, following which production of two prototypes was to begin.
To assist in launching the programme, Integrity obtained what was understood to be 12 uncompleted Trislander fuselages and eight sets of wings, more detailed examination revealing the totals to be 10 and six, respectively. One of these will become the second prototype, the first to be produced from a completed Trislander, the former demonstrator G-BEDO, first flown on 15 October 1976. Both prototypes to be converted by long-term Islander manufacturer, Romaero of Romania, which also responsible for technical drawings; certification in UK, supported by local Integrity design office. Configuration patented in USA.

CUSTOMERS: Potential sales of 1,500.
COSTS: USD1.7 million (estimated 2003).
DESIGN FEATURES: Single-engine version of BNG Trislander, itself basically a BNG Islander with third piston engine mounted at the intersection of cruciform empennage, Integrity changes restricted to installation of rear-mounted turboprop; fairing-over of wing engine/main landing gear attachments; forward fuselage extended 76 cm (30 in) to maintain C of G within limits and accommodate extra two seats; nose profile and avionics from current BNG Defender 4000.
Low risk development of proven airframe and engine, suitable for regional commuter services where ability to land on rough fields and (dis)embark passengers with engine running is an advantage.
FLYING CONTROLS: Conventional and manual. Slotted ailerons and electrically-actuated slotted flaps with permanent droop; ground-adjustable tab in starboard aileron; flight-adjustable trim tabs in rudder and each elevator.
STRUCTURE: Generally of riveted aluminium. Two-spar torsion-box wing in single piece; four-longeron, semi-monocoque fuselage of pressed frames and stringers and metal skin; local strengthening of rear fuselage, compared with Islander.
LANDING GEAR: Tricycle type; fixed. Wing-mounted cantilever main legs with integral oleo-pneumatic shock-absorbers. Single, steerable nosewheel; twin mainwheels; all tyres 7.00-6. Hydraulic and parking brakes.



Integrity single-turboprop adaptation of BNG Trislander 1151509



Integrity Integrity 18-passenger turboprop (Paul Jackson) 1151508

POWER PLANT: One 820 kW 1,100 shp Honeywell TPE331-12 turboprop driving a McCauley five-blade propeller. Fuel tanks in wings, outboard of landing gear attachments; total capacity 1,128 litres (298 US gallons; 248 Imp gallons).
ACCOMMODATION: Total 20 (or 13 to FAR Pt 23 certification) including one or two pilots. Internal noise suppression system.
SYSTEMS: Pop-out emergency generator and standby battery.
AVIONICS: Flight: TAWS, EGPWS, GPS.
Instrumentation: EFIS.
EQUIPMENT: Tail monitoring camera.
DIMENSIONS, EXTERNAL:
Wing span 16.15 m (53 ft 0 in)
Wing chord, constant 2.03 m (6 ft 8 in)
Wing aspect ratio 8.3
Length overall 15.77 m (51 ft 8¾ in)
Fuselage: Max width 1.21 m (3 ft 11½ in)
Max depth 1.46 m (4 ft 9¾ in)
Height overall 4.32 m (14 ft 2 in)
Tailplane span 6.44 m (21 ft 1½ in)
Wheel track (c/l shock-absorbers) 3.61 m (11 ft 10 in)
Wheelbase 7.88 m (25 ft 10¼ in)
Propeller diameter 2.21 m (7 ft 3 in)
DIMENSIONS, INTERNAL:
Cabin (rear of pilot's seat) volume 10.2 m³ (360 cu ft)
AREAS:
Wings, gross 31.31 m² (337.0 sq ft)
Ailerons (total) 2.38 m² (25.60 sq ft)
Trailing edge flaps (total) 3.62 m² (39.00 sq ft)
Fin 5.83 m² (62.70 sq ft)
Rudder, incl tab 1.13 m² (12.20 sq ft)
Tailplane 8.36 m² (90.0 sq ft)
Elevators (total) 2.42 m² (26.00 sq ft)
WEIGHTS AND LOADINGS:
Weight empty 2,359 kg (5,200 lb)
Max T-O weight 4,535 kg (10,000 lb)
Max wing loading 144.8 kg/m² (29.67 lb/sq ft)
Max power loading 5.53 kg/kW (9.09 lb/shp)
PERFORMANCE:
Cruising speed at 3,050 m (10,000 ft) 170 kt (315 km/h; 196 mph)
Stalling speed, flaps down 50 kt (93 km/h; 58 mph)
Max rate of climb at S/L 305 m (1,000 ft)/min
T-O run 412 m (1,350 ft)
Landing from 15 m (50 ft) 436 m (1,430 ft)
Landing run 258 m (845 ft)
Range 1,000 n miles (1,852 km; 1,150 miles)
Endurance: at cruising speed 6 h 30 min
at long-range speed 7 h 30 min

JABIRU

JABIRU AIRCRAFT PTY LTD
PO Box 5186, Bundaberg West, Queensland 4670
Tel: (+61 7) 41 55 17 78
Fax: (+61 7) 41 55 26 69
e-mail: info@jabiru.net.au
Web: www.jabiru.net.au
JOINT MANAGING DIRECTORS:
Phil Ainsworth
Rodney Stiff

UNITED KINGDOM AND BENELUX:
ST Aviation Ltd
Oaklands Farm, Coltstaple Lane, Horsham, West Sussex RH13 9BB
Tel: (+44 870) 300 05 01
Fax: (+44 1403) 73 11 23
Web: www.jabiru.co.uk
MANAGING DIRECTOR: Kevin Pearce

Jabiru formed 1988 by Rodney Stiff and Phil Ainsworth to produce Jabiru LSA 55/2K, but branched into engine design and manufacture when Italian-built KFM engine, which powered this variant, was withdrawn from market. Now produces 1,600 and 2,200 cc flat-four and 3,300 cc flat-six engines for its own and other manufacturers' aircraft. A factory-built SLA version of Jabiru, the UL 450, was launched in 2000. The company and aircraft are named for Australia's sole indigenous stork. Production averages 100 aircraft and 360 engines per year and by late 2004 had sold kits to 16 countries. A prototype of a four-seat Jabiru, the J400, first

flew in March 2001 and customer deliveries began almost immediately. By January 2006, 52 Jabirus were registered under Australian CAA regulations and in December 2005 the 1,000th Jabiru, a J160, was delivered to an Australian customer.
In late 2004, company held discussions with Seabird Aviation Jordan regarding assembly and support of Jabiru aircraft in the Middle East and North Africa which resulted in SAJ offering two Jabiru versions as the Yamamah Y-160 and Y-430. Jabiru is also the parent company of Microair Avionics.
The various Jabiru versions are summarised in the table for ease of reference.

JABIRU JABIRU

TYPE: Side-by-side ultralight/kitbuilt.
PROGRAMME: Design of original Jabiru LSA, started 1987; prototype (first of two, VH-JCX and VH-JQX) made first flight August 1989; first customer delivery April 1991; factory-built version certified to CAO 101 Pt 55 on 1 October 1991; 20 built with KFM engine as LSA 55/2K before change to 44.7 kW (60 hp) Jabiru 1600 flat-four as LSA 55/2J, many of these subsequently re-engined; kitplane construction certification achieved in Australia, New Zealand, South Korea, UK and USA by early 1997; marketed in US as amateur-built kit, achieving FAR Pt 21.191 (g) certification on 8 February 1996 (as well as Australian CAO 19 equivalent); marketing office opened at Aiken, South Carolina, in anticipation of substantial US sales of at least 100 per year but later closed in favour of network of dealerships. Total of 54 factory-built and 18 kitbuilt with 1600 engine between April 1993 and March 1996. More powerful ST version introduced in 1994; Jabiru 2200-powered LSA 55/3J received certification on 6 January 1998.
Joint venture announced in 1998 with CDE Aviation Company of Sri Lanka, subsidiary of Lionair, to establish Jabiru Asia for manufacture of Jabiru ST3 for Asian markets,

JABIRU LIGHTPLANE VARIANTS

Version	Fuselage	Wing	Engine	Gear	Fuel	Built	Rudder	Winglets
ST-3 (Certified)	Short	Short, Foam	2200	Nose	Fuselage	Factory	Inset	No
LSA (Certified)	Short	Short, Foam	2200	Nose	Fuselage	Factory	Inset	No
SP Series:								
SP	Long	Short, F or H	2200/3300	Nose	F/Wing	Kit	Inset	No
SP-T	Long	Short, F or H	2200/3300	Tail	F/Wing	Kit	Inset	No
UL Series:								
UL	Long	Long, F or H	2200/3300	Nose	F/Wing	Kit	Inset	No
UL-T	Long	Long, F or H	2200/3300	Tail	F/Wing	Kit	Inset	No
UL-C (Certified)	Long	Long, Foam	2200	Nose	Fuselage	Factory	Inset	No
J-Series:								
J200	J400	Short, Hollow	3300	Nose	Wing	Kit	Inset	No
J230	J400	Long, Hollow	3300	Nose	Wing	Kit	Horn	Yes
J230-C (Certified)	J400	Long, Hollow	3300	Nose	Wing	Factory	Horn	Yes
J250	J400	J250/J450	3300	Nose	Wing	Kit	Horn	Yes
J400 (4-seat)	J400	Short, Hollow	3300	Nose	Wing	Kit	Horn	Yes
J430 (4-seat)	J400	Long, Hollow	3300	Nose	Wing	Kit	Horn	Yes
J450 (4-seat)	J400	J250/J450	3300	Nose	Wing	Kit	Horn	Yes
J160 Series:								
J160	J160	Short, Hollow	2200	Nose	F/Wing	Kit	Horn	Yes
J160-C (Certified)	J160	Short, Hollow	2200	Nose	F/Wing	Factory	Horn	Yes
J170	J160	J250/J450	2200	Nose	F/Wing	Kit	Horn	Yes

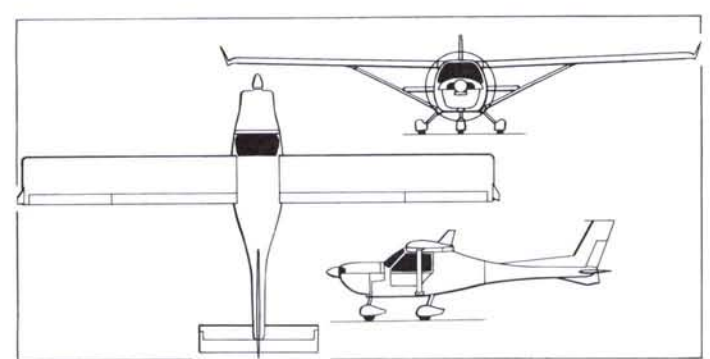
Notes: F is foam; H is hollow wing type



Jabiru UL two-seat ultralight (Paul Jackson) 1037933



Winglet-equipped Jabiru UL 450 built by Kev Bream (Paul Jackson) 1037934



Jabiru Calypso two-seat ultralight with short rudder (James Goulding) 1159095

especially India. Jabiru factory at Koggala, in southern Sri Lanka; intended to have production capacity for 40 aircraft per year, using engines and avionics imported from Australia, and airframes manufactured locally. Nothing further had been heard of this by 2003.

CURRENT VERSIONS: **Jabiru LSA:** Light Sport Aircraft; factory-built; registered under AUF (Australian Ultralight Federation) rules (Pt 101.55); certified under CASA Pt 21.13A 6 June 2002. 'Short span; short fuselage' version: span 8.03 m (26 ft 4 in), length 5.03 m (16 ft 6 in), wing area 7.90 m² (85.0 sq ft).

Jabiru ST: Certified version of LSA; in factory production from mid-1994 and certificate awarded 1 July 1994; first was 50th production Jabiru. In mid-1998, the 17th production ST was registered VH-JRU to Jabiru Aircraft as the first **ST-3** short span and fuselage.

Jabiru SK: Quick-build kit version of ST (components are manufactured alongside production aircraft); first was 66th production Jabiru; quoted home-build time is 600 hours.

Jabiru SP4: Kit, combining longer fuselage of UL 450 with Jabiru 2200 engine and short-span wings of SK; originally designated SP. MTOW 470 kg (1,036 lb); stalling speed 39 kt (73 km/h; 45 mph); optimised for Canadian, Chilean and South African markets, among others. Fuel capacity 70 litres (18.5 US gallons; 15.4 Imp gallons).

Jabiru SP6: Company designation of SP4 kit with 89.5 kW (120 hp) Jabiru 3300 engine. Also known as **Jabiru SP 3300**. MTOW 500 kg (1,102 lb). Cruising speed 117 kt (217 km/h; 135 mph). Fuel capacity as SP4, or 85 litres (22.5 US gallons; 18.7 Imp gallons) optional.

Jabiru SP-T: Tailwheel version of SP; both four- and six-cylinder versions available. Enlarged rudder; mainwheel legs moved forward; steerable tailwheel and differential braking. Prototype built by Peter Kayne of Narrogin, Western Australia.

Jabiru SP 480: Proposed version of SP for JAR-VLA certification, with maximum take-off weight of 480 kg (1,058 lb); under development in late 1999.

Jabiru Calypso: Initially factory-built; now available only as kit; previously known as **UL 450**; SLA (Small Light Aeroplane to UK's now-replaced BCAR Section S), first aircraft was built in Ireland in 1998. Launched in UK in 2000 and meeting 35 kt (65 km/h; 41 mph) stalling speed requirement. Differences from SK include wing span increased by 1.37 m (4 ft 6 in); fuselage by 0.61 m (2 ft 0 in); flaps by total of 1.83 m (6 ft 0 in); and reduced ventral fin. Also available with tailwheel as **Calypso T**. Meets FAA LSA. More than 200 sold by end 2004.

Jabiru UL-C and UL-D: Factory-built version of Calypso, designed to meet CAO 101.55; CASA approval received 2 December 2004 (UL-C) and 11 February 2005 (UL-D). Powered by Jabiru 2200B; first aircraft was c/n 610.

J200, J400 and J160: Developed versions; *described separately*.

CUSTOMERS: Production of complete and kit aircraft totalled over 660 by mid-2006.

COSTS: Calypso: USD25,000; minus engine, USD35,900 with Jabiru 2200 and USD39,900 with Jabiru 3300 engine (2006). Flyaway Calypso 2200 USD59,995 (April 2002).

DESIGN FEATURES: Designed to Australian AUF Pt 101.55 and British BCAR Section S, with reference to FAR Pt 21 and JAR-VLA. Ultralight or certified aircraft, suitable for factory or amateur assembly. Unswept wing (braced) and tailplane, swept fin; dorsal and ventral fins; all flying surfaces square-tipped; wings detachable for storage and transportation. Quoted build time 600 hours.

Wing section NASA 4412; drooped wingtips; dihedral 1° 15'; incidence 2° 30'; no twist.

FLYING CONTROLS: Conventional and manual. In-flight adjustable pitch trim; wide-span slotted flaps. Original short rudder supplanted by full-height rudder (also available as retrofit) on all versions. From 2002, enlarged fin version (¾ height rudder) adopted, entire vertical tail being moved further forward.

STRUCTURE: All-GFRP except metal wing struts, nosewheel assembly and engine mount.

LANDING GEAR: Tricycle type, fixed. Fuselage-mounted spring GFRP cantilever mainwheel legs with speed fairings. Nosewheel steerable ±15°, coupled to rudder and with compressed rubber shock-absorber. Mainwheels 4.00-6 or 5.00-6; Bigfoot 6.00-6 tyres optional. Nosewheel 2.60-4, 4.00-4 or 5.00-6; tailwheel 250x50.

POWER PLANT: One 59.7 kW (80 hp) Jabiru 2200A/J flat-four engine, driving a two-blade, fixed-pitch, wood/composites propeller. Fuel capacity 65 litres (17.2 US gallons; 14.3 Imp gallons).

SYSTEMS: 12 V DC electrical system with 100 W capacity; 20 Ah battery.

AVIONICS: *Comms:* VHF antenna (inside fin) and intercom standard.

Instrumentation: Basic VFR; vacuum instruments optional.

Data below refer to Jabiru Calypso with Jabiru 2200 engine.

DIMENSIONS, EXTERNAL:

Wing span: normal	9.40 m (30 ft 10 in)
with winglets	9.56 m (31 ft 4½ in)
Length overall	5.64 m (18 ft 6 in)
Height overall	2.01 m (6 ft 7 in)

DIMENSIONS, INTERNAL:

Cockpit max width at shoulder	1.07 m (3 ft 6 in)
-------------------------------	--------------------

AREAS:

Wings, gross	9.29 m ² (100.0 sq ft)
--------------	-----------------------------------

WEIGHTS AND LOADINGS:

Weight empty, equipped	242 kg (534 lb)
Max T-O weight	450 kg (992 lb)

PERFORMANCE:

Never-exceed speed (VNE)	120 kt (222 km/h; 138 mph)
Max level speed	110 kt (204 km/h; 127 mph)
Cruising speed at 75% power	100 kt (185 km/h; 115 mph)
Stalling speed, flaps down	35 kt (65 km/h; 41 mph)
Max rate of climb at S/L	305 m (1,000 ft)/min
T-O run	100 m (330 ft)
Landing run	168 m (555 ft)
Range with max fuel	430 n miles (796 km; 494 miles)

JABIRU J SERIES

TYPE: Four-seat kitbuilt.

PROGRAMME: Developed as four-seat version of Jabiru, although with option of installing only two seats in enlarged cabin. Prototype (19-3512), in ultralight configuration, first flew 16 March 2001. Maiden flight of first customer-built J200, 13 December 2001. Meets FAA 51% rule.

CURRENT VERSIONS: **J200:** Two-seat ultralight with same dimensions as J400. **200A** has maximum allowable T-O weight; **200B** limited to 544 kg (1,200 lb) to meet AUF ultralight rules.



Jabiru J250 registered in US (Paul Jackson)

1037935



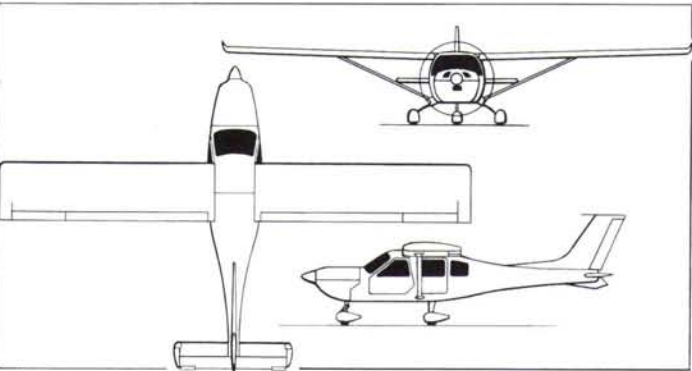
Jabiru J400 on Australian register (Paul Jackson)

1037936



Australian ultralight category Jabiru J200 (Paul Jackson)

1037940



Two/four-seat Jabiru J200/J400 (James Goulding)

1159099

J230: Two-seat version combining J200 fuselage with Jabiru Calypso wing. Factory-built, certified J230-C was under development in 2006.

J250: Announced at Sun 'n' Fun, April 2002; meets FAA LSA kitbuilt rules. Wing span and area increased to meet stall requirements of 44 kt (82 km/h; 51 mph) 'clean' and 39 kt (73 km/h; 45 mph) flaps down.

J400: Four-seat lightplane.

J430: Four-seat version of J230.

J450: US market version (also sold in South Africa). Increased wing span (9.14 m; 30 ft 0 in) and area (11.15 m²; 120.0 sq ft); fuel 139 litres (36.8 US gallons; 30.7 Imp gallons).

J450A: As J450, but higher max T-O weight.

CUSTOMERS: Total 300 kits produced by mid-2006 for customers in Australia, Brazil, Canada, France, Namibia, New Zealand, South Africa and US.

COSTS: J200 kit USD34,000, without engine (USD48,400 with engine); J250 kit USD36,000 (USD50,400); J400 kit USD38,000 (USD52,400); J450 kit USD40,000 (USD54,400) (all 2006).

Data generally as for Jabiru Jabiru, except that below.

DESIGN FEATURES: Stretched fuselage with second pair of side windows. Wings of Jabiru LSA, with fuel in wings. Horn-balanced rudder. Quoted build time 600 hours.

LANDING GEAR: Generally as Jabiru, Larger 5.00–6 wheels standard on J400 with 4.00–4 wheels optional.	
POWER PLANT: One 89.5 kW (120 hp) Jabiru 3300 flat-six, driving Sensenich W64ZK-49 two-blade fixed-pitch propeller. Fuel capacity 137 litres (36.2 US gallons; 30.1 Imp gallons) in wings, of which 130 litres (34.3 US gallons; 28.6 Imp gallons) is usable. Oil capacity 2.3 litres (0.61 US gallons; 0.51 Imp gallons).	
ACCOMMODATION: Four persons; or two, if flown to ultralight regulations. Three doors on J400; rear port door operable only when flaps retracted.	
DIMENSIONS, EXTERNAL:	
Wing span: J200A, J200B, J400	8.10 m (26 ft 7 in)
J230, J430	9.58 m (31 ft 5 in)
J250, J450	9.14 m (30 ft 0 in)
Wing chord: J200A, J200B, J400	0.99 m (3 ft 3 in)
Wing aspect ratio: J200A, J200B, J400	8.2
J230, J430	9.7
J250, J450	7.5
Length overall	6.55 m (21 ft 5 3/4 in)
Height overall: J200A, J200B, J400	2.20 m (7 ft 2 1/2 in)
J230, J250, J430, J450	2.40 m (7 ft 10 1/2 in)
Tailplane span	2.66 m (8 ft 8 3/4 in)
Wheel track: J200A, J200B, J400	1.88 m (6 ft 2 in)
J230, J250, J430, J450	1.82 m (5 ft 11 1/2 in)
Propeller diameter: all	1.52 m (5 ft 0 in)
DIMENSIONS, INTERNAL:	
Cabin: Max width	1.12 m (3 ft 8 in)
Max height	1.09 m (3 ft 7 in)
AREAS:	
Wings, gross: J200A, J200B, J400	8.00 m ² (86.1 sq ft)
J230, J430	9.48 m ² (102.0 sq ft)
J250, J450	11.15 m ² (120.0 sq ft)
WEIGHTS AND LOADINGS:	
Weight empty: J200A, J400	315 kg (694 lb)
J200B	310 kg (683 lb)
J230, J250, J430, J450	340 kg (750 lb)
Max T-O weight: J200B, J450	544 kg (1,200 lb)
J200A, J230, J400, J430, J450A	700 kg (1,543 lb)
J250	558 kg (1,232 lb)
Max wing loading: J200A, J400	87.5 kg/m ² (17.92 lb/sq ft)
J200B	68.0 kg/m ² (13.94 lb/sq ft)
J230, J430	73.8 kg/m ² (15.12 lb/sq ft)
J250	50.1 kg/m ² (10.27 lb/sq ft)
J450	48.8 kg/m ² (10.00 lb/sq ft)
J450A	62.8 kg/m ² (12.86 lb/sq ft)
Max power loading: J200A, J230, J400, J430, J450A	7.82 kg/kW (12.86 lb/hp)
J200B, J450	6.08 kg/kW (10.00 lb/hp)
J250	6.25 kg/kW (10.27 lb/hp)
PERFORMANCE:	
Never-exceed speed (VNE):	
J200A, J200B, J400	138 kt (255 km/h; 159 mph)
J230, J430	135 kt (250 km/h; 155 mph)
Manoeuvring speed: J200A, J200B, J400	
J230, J430	130 kt (241 km/h; 150 mph)
J250, J450	115 kt (213 km/h; 132 mph)
J250, J450	125 kt (232 km/h; 144 mph)
Normal cruising speed	
Stalling speed, power off:	
flaps up:	
J200A, J400	60 kt (111 km/h; 69 mph)
J200B	51 kt (95 km/h; 59 mph)
J230, J430	50 kt (93 km/h; 58 mph)
J250, J450	44 kt (82 km/h; 51 mph)
flaps down:	
J200A, J400	48 kt (89 km/h; 56 mph)
J200B, J230, J430	45 kt (84 km/h; 52 mph)
J250, J450	39 kt (73 km/h; 45 mph)
Max rate of climb at S/L:	
J200A, J200B, J230, J400, J430	305 m (1,000 ft)/min
J250, J450	457 m (1,500 ft)/min
Service ceiling: all	
T-O run: J200B	
J200A, J400	200 m (660 ft)
J230, J430	300 m (985 ft)
J250, J450	150 m (495 ft)
J250, J450	100 m (330 ft)

Landing run:	
J200A, J200B, J250, J400, J450	200 m (660 ft)
J230, J430	250 m (820 ft)
Range: J200A, J200B, J400	720 n miles (1,333 km; 828 miles)
J230, J430	800 n miles (1,481 km; 920 miles)
J250, J450	690 n miles (1,277 km; 794 miles)
Endurance: J200A, J250, J450	6 h 0 min
J230, J430	6 h 42 min
g limits: all	+3.8/-2.0

JABIRU J160 SERIES

TYPE: Side-by-side ultralight/kitbuilt.
PROGRAMME: Further development of two-seat Jabiru, based on wider fuselage and horn-balanced rudder of J200/J400 series. Prototype J160 first flew April 2004 and made public debut at Natfly air show, Narromine, later that month. Initially marketed as kitbuilt, but J160-C certified by Australian CASA on 21 December 2005, beginning with 29th aircraft. J170 offered to US LSA category.
CURRENT VERSIONS: **J160:** Basic version; kitbuilt.
J160-C: Certified, factory-built version of J160.
J170SP: Introduced in 2005. Optimised for Light Sport Aircraft category in U.S. Increased span wing with winglets, wider cockpit with Y-shape central control stick and horn-balanced rudder. All tyres 13x5 00-6. Kitbuilt.
CUSTOMERS: Total over 70 kits delivered by mid-2006 to Australia, New Zealand, Norway and US.
DESIGN FEATURES: Generally as earlier two-seat, 2200-powered Jabiru, but wider and higher cockpit; horn-balanced rudder; various wing options.



Jabiru J170SP being marketed in the US for the LSA category (Paul Jackson) 1037930

JUST PLANE PASSIONS

AERO V AUSTRALIA PTY

Light Aeronautics Industry Cluster, Illawarra Regional Airport, Albion Park Rail, New South Wales 2527
e-mail: kgarland11@bigpond.com
DIRECTORS:
Kenneth Garland
Dianne Garland

Aero V established the Just Plane Passions division following its acquisition in 2004 of rights to build the Sadler Vampire in its civilian form, plus associated jigs and tools with which to restart production. Company headquarters transferred from Camden to Illawarra Regional Airport in August 2005.

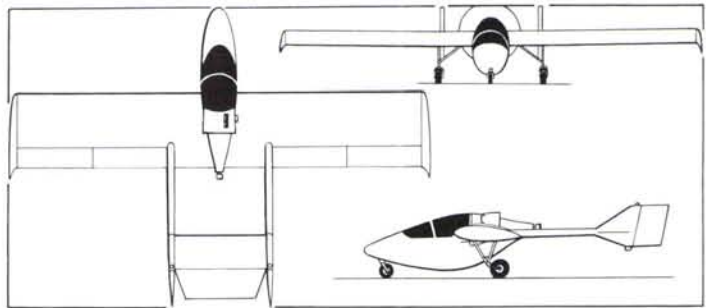
JUST PLANE PASSIONS VAMPIRE SV-2

TYPE: Single-seat ultralight.
PROGRAMME: Designed by William G Sadler; American Microflight Vampire won Grand Champion Design at EAA Convention, Oshkosh, 1982. US production, as complete aircraft, begun in 1982, accounted for 36 in Part 103 Ultralight category; plus one in Experimental category (N7V); and one custom-built Ro-dair (with modified fins). Rights to civil version sold in Australia, but Mr Sadler continued to promote military applications, producing the Sadler Aircraft Corporation A-22 Piranha (N22AB) in 1989 and Turkish-built TAI TG-X1 Yarasas in 1997, both having been described in *Jane's All the World's Aircraft* in the late 1990s. Development continues (www.sadlerair.com).
Australian manufacture by Skywise Ultralight Pty Ltd at Bankstown, Sydney, under ANO 95.25 ultralight regulations, initially as SV-1 with 22.4 kW (30 hp) KFM 107ER, but mostly in SV-2 form with Rotax 447. Total of 23 (plus two remanufactured) completed between 1998 and 1990, further three appearing in early 1990s after Skywise's bankruptcy. Additionally, one side-by-side seat aircraft built, but not flown; currently owned by Ronald M Fisher & Associates, Torquay, Victoria, and fitted with a 59.7 kW (80 hp) Jabiru 2200; unofficially named Kingfisher.
Manufacturing rights to Vampire transferred to Alan Daffy in 1990; Bryan Gabriel in 1991; John Hinton and Dave Bailey in 1995; Kirk Sutton in 1999; thence to Aero V. Rollout of initial new-built aircraft was intended in July 2005 but was not known to have taken place



First production Skywise Vampire promoting latest version built in Australia by Just Plane Passions (Paul Jackson) 1151729

DIMENSIONS, EXTERNAL:	
Wing span: J160	8.12 m (26 ft 7¾ in)
J170SP over winglets	9.66 m (31 ft 8¼ in)
Wing chord	0.99 m (3 ft 3 in)
Wing aspect ratio: J160	8.2
J170SP	9.3
Length overall	5.78 m (18 ft 11½ in)
Height overall	2.30 m (7 ft 6½ in)
Tailplane span	2.35 m (7 ft 8½ in)
Wheel track	1.90 m (6 ft 3 in)
DIMENSIONS, INTERNAL:	
Cabin max width	1.14 m (3 ft 9 in)
AREAS:	
Wings, gross: J160	8.04 m² (86.5 sq ft)
J170SP	9.29 m² (100.0 sq ft)
WEIGHTS AND LOADINGS:	
Weight empty: J160	268 kg (591 lb)
J170SP	290 kg (639 lb)
Max T-O weight	544 kg (1,200 lb)
Max wing loading: J160	67.7 kg/m² (13.87 lb/sq ft)
J170SP	58.6 kg/m² (12.00 lb/sq ft)
Max power loading	8.58 kg/kW (14.12 lb/hp)
PERFORMANCE:	
Never-exceed speed (VNE): J160	132 kt (244 km/h; 152 mph)
J170SP	125 kt (231 km/h; 143 mph)
Manoeuvring speed	105 kt (194 km/h; 121 mph)
Normal cruising speed	100 kt (185 km/h; 115 mph)
Stalling speed, power off:	
flaps up: J160	49 kt (91 km/h; 57 mph)
J170SP	45 kt (84 km/h; 52 mph)
flaps down: J160	43 kt (80 km/h; 50 mph)
J170SP	38 kt (71 km/h; 44 mph)
Max rate of climb at S/L: J160	152 m (500 ft)/min
J170SP	213 m (700 ft)/min
Service ceiling	4,570 m (15,000 ft)
T-O run: J160	200 m (660 ft)
J170SP	140 m (459 ft)
Landing run: J160	165 m (545 ft)
J170SP	150 m (495 ft)
Range: J160	500 n miles (926 km; 575 miles)
J170SP	1,030 n miles (1,907 km; 1,185 miles)
Endurance: J160	5 h 0 min
J170SP	10 h 18 min
g limits	+3.8/-2.0



Just Plane Passions Vampire single-seat ultralight (James Goulding) 1121714

several months later. Changes from original include compressed rubber suspension, composites propeller and differential hydraulic brakes. Two-seat version may be introduced later.
CURRENT VERSIONS: **Vampire S-2A:** Manufactured by Aero V/Just Plane Passions.
DESIGN FEATURES: Twin-boom pusher configuration with constant-chord wing at mid-fuselage, outer wing panels folding for storage.
Wing section NACA 63 3-A218.
FLYING CONTROLS: Conventional and manual, including single-piece elevator and twin rudders, flaps.
STRUCTURE: Generally metal, with non-structural Kevlar/glass fibre pod skins; 6061-T6 aluminium alloy booms and empennage and 2024-T3 Alclad wings.
LANDING GEAR: Tricycle type; fixed. Wing-mounted, tube metal tripod mainwheel legs with compressed rubber shock-absorbers. Hydraulic brakes.
POWER PLANT: One 31.0 kW (41.6 hp) Rotax 447 UL two-cylinder, liquid-cooled two-stroke driving a three-blade Ultra-Prop composites propeller. Fuel in wingroots, total usable capacity 40 litres (10.6 US gallons; 8.8 Imp gallons).
DIMENSIONS, EXTERNAL:

Wing span	6.78 m (22 ft 3 in)
Width, wings folded	2.49 m (8 ft 2 in)
Length overall	4.98 m (16 ft 4 in)
Height overall	1.36 m (4 ft 5½ in)

AREAS:

Wings, gross	8.55 m² (92.0 sq ft)
--------------	----------------------

WEIGHTS AND LOADINGS:

Weight empty	170 kg (348 lb)
Max T-O weight	290 kg (639 lb)

PERFORMANCE:

Max level speed	85 kt (157 km/h; 98 mph) IAS
Normal cruising speed	75 kt (139 km/h; 86 mph) IAS
Stalling speed: flaps up	38 kt (71 km/h; 44 mph) IAS
flaps down	34 kt (63 km/h; 40 mph) IAS
Max rate of climb at S/L	244 m (800 ft)/min
T-O run	120 m (395 ft)
Landing run	100 m (330 ft)
g limits (ultimate)	+6/-4

SEABIRD

SEABIRD AVIATION AUSTRALIA PTY LTD

Hervey Bay Airport, PO Box 618, Pialba, Hervey Bay, Queensland 4655
 Tel: (+61 7) 41 25 31 44
 Fax: (+61 7) 41 25 31 23
 e-mail: seabirdaust@optusnet.com.au
 CHAIRMAN: Donald C Adams
 MANAGING DIRECTOR: Peter Adams

Seabird Aviation was founded in 1983 to develop the Seeker observation aircraft. Despite having built Seekers for certification, Seabird's business plan was always to franchise Seeker production capability, rather than sell individual aircraft; entire manufacturing equipment for

a Seeker production line can be forwarded in two standard-size ISO shipping containers.

On 25 July 2000, Seabird signed an agreement with Evkektor-Aerotechnik (EV-AT) of the Czech Republic leading to the formation of a joint venture company, Evkektor-Seabird Pty Ltd, to manufacture and market the Seeker. This is no longer in operation, having produced no aircraft by mid-2003, when Seabird reached a new agreement with KADDB of Jordan for local assembly in quantity: the joint venture is known as Seabird Aviation Jordan (SAJ). Accordingly, the aircraft is described in the Jordanian section of *Jane's All the World's Aircraft*. SAA retains ownership of the Type Certificate and has issued licences to SAJ and Seabird Aviation America (SAAM).

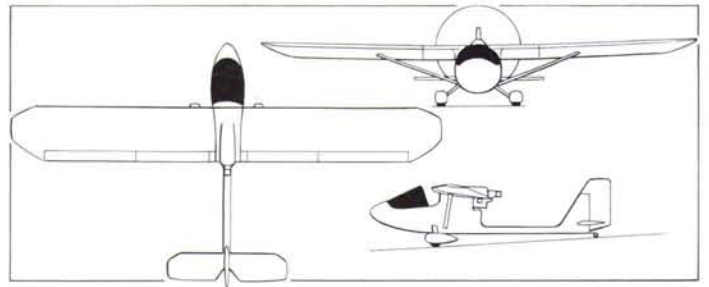
Of five seekers completed up to end of 2004, two prototypes had been withdrawn from use and the remaining three transferred to Jordan for resale or demonstration. Jordanian production has been delayed but was due to begin in 2006. At this time SAA was building first aircraft for SAAM at its Hervey Bay plant using components fabricated in India.

SAPPHIRE

SAPPHIRE AIRCRAFT AUSTRALIA PTY LTD

PO Box 96, Epsom, Victoria 3551
 Tel/Fax: (+61 3) 54 39 71 68
 e-mail: stevendumesny@bigpond.com
 Web: www.users.bigpond.com/stevendumesny/
 SALES MANAGER: Steven Dumesny

Formed on 2 July 1998, Sapphire markets an updated version of the Winton Sapphire, designed to CAO 19 by Scott Winton. A two-seat version, nominally designated Sapphire Scenic, and a self-launching glider, were under development, but have been cancelled.



Sapphire LSA Mk II (James Goulding)

0561622

SAPPHIRE LSA Mk II

TYPE: Single-seat ultralight/kitbuilt.

PROGRAMME: Introduced in 1998. First kit delivered in May 1999 and flown in September 1999. Company aims to produce one factory-built aircraft per year to evaluate production methods and develop kit manual; remainder of production is of kit version.

CURRENT VERSIONS: **Sapphire LSA:** Available as factory-built version meeting Australian CAO 95 Pt 25 certification standards, or as kitbuilt to CAO 95 Pt 10. Three kits available: Basic, comprising main airframe components; Intermediate, with control systems completed; and Advanced, including engine, propeller and instruments. All kits qualify for 51 per cent amateur-built kit regulations.

Sapphire Scenic: Proposed two-seat version under development; MTOW of 500 kg (1,102 lb), 94 kt (174 km/h; 108 mph) cruise. Cost approximately AUD35,000, plus tax (2002); project cancelled late 2003.

CUSTOMERS: First kit sold May 1999. Total of 42 flying by January 2003, including two factory-built.

COSTS: Factory-built flyaway AUD35,266, kit AUD23,650 (2005). Estimated total cost of kit to flying condition AUD30,000 inclusive.

DESIGN FEATURES: Pod-and-boom fuselage with strut-braced shoulder-mounted wings; open cockpit with large windscreen. Baggage box, volume 25 litres (0.88 cu ft), in fuselage pod. FLYING CONTROLS: Conventional and manual. Ailerons and trimmable all-flying tailplane operated by pushrods; rudder spring-coupled to tailwheel; quarter-span flaps; deflections 5° up (for fast cruising) and 20 and 40° down.

STRUCTURE: Mostly composites; GFRP fuselage pod reinforced with internal bulkheads; aluminium tailboom; wings of GFRP with foam ribs; fin is of GFRP; horizontal tail and rudder of aluminium tube with fabric covering. Wings and horizontal tail detach for storage or transport; quoted disassembly/assembly times 10 minutes and 5 minutes respectively.



Sapphire LSA single-seat ultralight (Paul Jackson)

1037937

LANDING GEAR: Tailwheel type; fixed. Fuselage-mounted spring laminated GFRP cantilever main legs. Mainwheel size 11–4.00x5. Cable-operated brakes. Wheel fairings optional. At least one nosewheel-equipped Sapphire conversion exists.

POWER PLANT: One 29.5 kW (39.6 hp) Rotax 447 UL-1V in kit-built aircraft; 34.0 kW (45.6 hp) Rotax 503 UL-1V two-cylinder two-stroke, driving a Sweetapple two- or three-blade wooden pusher propeller via 2.24:1 reduction gearing in factory-built aircraft. Integral fuel tanks in wings, standard capacity 38 litres (10.0 US gallons; 8.4 Imp gallons), optional 58 litres (15.3 US gallons; 12.8 Imp gallons).

EQUIPMENT: Fully enclosed canopy and strut fairings optional.

DIMENSIONS, EXTERNAL:

Wing span	8.84 m (29 ft 0 in)
Length overall	5.00 m (16 ft 4 3/4 in)
Height overall	1.25 m (4 ft 1 1/4 in)
Propeller diameter	1.27 m (4 ft 2 in)

DIMENSIONS, INTERNAL:

Cabin max width	0.61 m (2 ft 0 in)
-----------------------	--------------------

AREAS:

Wings, gross	9.13 m ² (98.3 sq ft)
--------------------	----------------------------------

WEIGHTS AND LOADINGS:

Weight empty	158 kg (348 lb)
Max T-O weight	350 kg (771 lb)

PERFORMANCE:

Never-exceed speed (VNE)	98 kt (181 km/h; 112 mph)
Cruising speed at 75% power:	
without fairings	75 kt (139 km/h; 86 mph)
with fairings: two-blade propeller	75 to 85 kt (139 to 157 km/h; 86 to 98 mph)
three-blade propeller	87 to 89 kt (161 to 165 km/h; 100 to 102 mph)
Stalling speed: power on	34 kt (63 km/h; 40 mph)
power off	36 kt (67 km/h; 42 mph)
Max rate of climb at S/L	305 m (1,000 ft)/min
Service ceiling	3,660 m (12,000 ft)
T-O run	55 m (180 ft)
Landing run	100 m (330 ft)
Range	328 n miles (607 km; 377 miles)
Endurance	3 h 30 min
g limits	+8/-4

STORCH

STORCH AVIATION AUSTRALIA PTY LTD

SUPERMARINE

SUPERMARINE AIRCRAFT PVT LTD

388 Hawksbury Road, Moggill, Queensland 4070
 Tel: (+61 7) 32 02 96 19
 e-mail: enquiries@supermarineaircraft.com
 Web: www.supermarineaircraft.com
 MANAGER: Michael O'Sullivan
 ASSISTANT MANAGER: Geoff Braddock

Michael (Mike) O'Sullivan founded Supermarine Aircraft Pty Ltd in 1992 to develop a kitbuilt scale replica of the Second World War Supermarine Spitfire. Local dealers have been appointed in New Zealand, South Africa, UK and US. Factory area 1,050 m² (11,300 sq ft); workforce stood at 10 in 2005.

SUPERMARINE SPITFIRE

TYPE: Tandem-seat sportplane kitbuilt.

Storch Aviation Australia Pty Ltd had transferred its operations to Serbia by 2005.

PROGRAMME: Prototype Mk 25 first flew in November 1995. Designations follow from Mk 24 version produced by original Supermarine company. First UK-built aircraft flew 19 April 2005; conditional type approval granted by PFA on 21 September 2005. Isuzu V-6 engine first flown 2004 (VH-SFG) and adopted as recommended engine by Supermarine.

CURRENT VERSIONS: **Spitfire Mk 25:** Single-seat version to 75 per cent scale. Discontinued by 2003.

Spitfire Mk 26: Two-seat and sole production version, with accommodation for pilot and passenger in tandem under single canopy, or pilot and additional fuel or baggage.

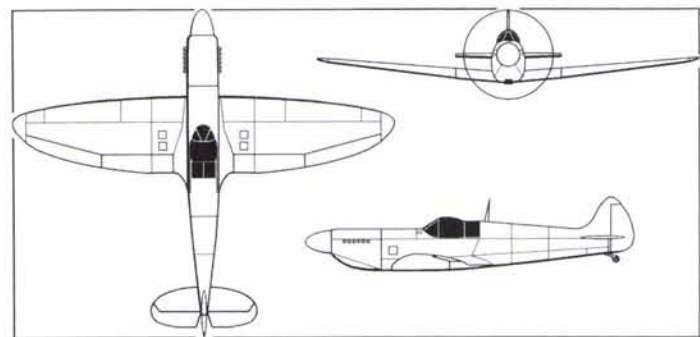
CUSTOMERS: Total of 70 of both versions sold by late 2005. US marketing began at Sun 'n' Fun in April 2004. Customers in Australia, Canada, South Africa, UK, US and elsewhere; eight flying and nine more under construction in Australia by late 2005. UK had 14 under construction in 2005.

COSTS: Development AUD2.5 million. Complete basic kit from AUD118,250 not including engine, propeller, instruments, shipping or taxes (2005). Price, complete and flyaway, AUD325,000 (2005).

DESIGN FEATURES: Scale replica of Supermarine Spitfire. Wings de-rig for storage or road transport. Supplied as complete kit; main airframe components are jig-assembled at factory for completion by customer; quoted build time 1,000 to 1,200 hours. Complies with FAA



Supermarine Spitfire Mk 26 two-seat kitplane 1151709



Authentic lines of the Supermarine Spitfire Mk 26 (Paul Jackson) 0569577



Australian amateur-built Supermarine Spitfire Mk 26 (Paul Jackson) 1121609

and other authorities' 51 per cent homebuilding rules. Can operate as Australian Ultralight under RAA rules with single seat.
Wing section similar to original; dihedral 5°; incidence 2° 10'; washout 2°.

FLYING CONTROLS: Conventional and manual; surfaces mass-balanced, with horn-balanced elevators; electric split flaps, max deflection 65°; pushrod actuation, except cable actuated rudder and pitch trim.	
STRUCTURE: Aluminium throughout, except for glass fibre cowling and non-structural fairings. Two-spar wing. Flush riveting and etch primed throughout.	
LANDING GEAR: Tailwheel type; electrically retractable mainwheels. Main tyres 6.00. Hydraulic disc brakes.	
POWER PLANT: One 134 kW (180 hp) Jabiru 5100 eight-cylinder four-stroke, driving a two- or four-blade constant-speed propeller. Optionally 186 kW (250 hp) General Motors Isuzu V-6 motorcar engine driving an IVO two-, three- or four-blade propeller via 1.6:1 belt reduction gear. Fuel capacity: standard 115 litres (30.4 US gallons; 25.3 Imp gallons); 'wet wing' option adds further 160 litres (42.3 US gallons; 35.2 Imp gallons).	
DIMENSIONS, EXTERNAL:	
Wing span	8.44 m (27 ft 8¼ in)
Length overall	7.24 m (23 ft 9 in)
Height at spinner	2.06 m (6 ft 9 in)
Wheel track	1.68 m (5 ft 6¼ in)
AREAS:	
Wings, gross	11.33 m ² (122.0 sq ft)
WEIGHTS AND LOADINGS:	
Weight empty: normal	460 kg (1,014 lb)
RAA Ultralight	405 kg (893 lb)
Max T-O weight: normal	810 kg (1,785 lb)
RAA Ultralight	560 kg (1,234 lb)
Max wing loading	57.3 kg/m ² (11.75 lb/sq ft)
Max power loading (Jabiru)	5.59 kg/kW (9.18 lb/hp)
PERFORMANCE:	
Never-exceed speed (VNE)	193 kt (357 km/h; 222 mph)
Cruising speed at 75% power	160 kt (296 km/h; 184 mph)
Manoeuvring speed	240 kt (232 km/h; 150 mph)
Stalling speed: flaps up	45 kt (84 km/h; 52 mph)
landing configuration	42 kt (78 km/h; 49 mph)
Max rate of climb at S/L	762 m (2,500 ft)/min
Service ceiling	5,490 m (18,000 ft)
T-O run	207 m (680 ft)
Landing run	445 m (1,460 ft)
Max range	434 n miles (804 km; 500 miles)
Endurance at econ cruising speed, with reserves	3 h 0 min
g limits	+6/-4

TEKNICO

TEKNICO PTY LTD

PO Box 680, Pit Lane, Victor Harbor, South Australia 5211
Tel: (+61 8) 85 52 28 82
Fax: (+61 8) 85 52 73 16
e-mail: aeropup@arcom.com.au
Web (1): www.supapup.net
Web (2): www.aeropup.com
MANAGING DIRECTOR: John Cotton

Company previously named Aerosport Pty Ltd and Supapup Aircraft. Early versions (Mks 1, 2 and 3) of SupaPup hand-built at Hahndorf, South Australia, until cost of compliance with local airworthiness directives forced closure of company. Aerosport redesigned aircraft as Mk 4 in 1992 and returned to business (as Teknico) with relaunched production line for kits. Most are operated under ultralight rules (homebuilt, uncertified). Two-seat AeroPup launched in 2002.
Company moved from Oakbank to current location in 2005 and concentrates on two-seat Aeropup.

TEKNICO AEROPUP

TYPE: Side-by-side ultralight kitbuilt.
PROGRAMME: First flown 2002; kit production under way by November 2002.
CUSTOMERS: Total of 17 built by December 2005 and further six then on order.
COSTS: Kit, less engine, instrument and covering AUD26,000 (2005).
The description for the SupaPup Mk IV applies also to the AeroPup except as follows:



Teknico Aeropup 1113689

DESIGN FEATURES: Two-seat version of SupaPup Mk IV. Quoted build time 350 hours.
FLYING CONTROLS: Dual controls standard, with centrally mounted control column. Flaps standard.
LANDING GEAR: Tailwheel type; fixed. Two faired-in side Vs hinged to lower longerons, plus half-axes, each with shock absorber, attached to compression frame. Steerable tailwheel.

POWER PLANT: Engines in 48.5 kW (65 hp) to 74.6 kW (100 hp) range according to customer choice; Jabiru, Rotax or Subaru recommended. Fuel capacity 90 litres (23.8 US gallons; 19.8 Imp gallons) in two wing tanks.

DIMENSIONS, EXTERNAL:

Wing span 8.20 m (26 ft 10¾ in)
Length overall 6.03 m (19 ft 9½ in)
Height 1.67 m (5 ft 5¾ in)

DIMENSIONS, INTERNAL:

Cabin max width:
standard windows 1.07 m (3 ft 6 in)
bulged windows 1.14 m (3 ft 9 in)

AREAS:

Wings, gross 10.06 m² (108.3 sq ft)

WEIGHTS AND LOADINGS:

Weight empty, typical 270 kg (595 lb)
Baggage capacity 40 kg (88 lb)
Max T-O weight 750 kg (1,653 lb)

PERFORMANCE:

Stalling speed 42 kt (78 km/h; 49 mph)
T-O to 15 m (50 ft) 100 m (330 ft)
Endurance with aux tank and 10% reserves more than 4 h
g limits +5/-3

TEKNICO SUPA'PUP MK IV

TYPE: Single-seat ultralight kitbuilt.

PROGRAMME: Original Aerosport company developed and produced three earlier versions of the Supa'Pup from the mid-1980s onwards; Supa'Pup Mk IV first flown in early 1998. Some registered as lightplanes; most as ultralights with 544 kg (1,200 lb) MTOW limitation under CAO 95 Pt 10.

CUSTOMERS: By November 2005, 28 Supa'Pup kits had been supplied.

COSTS: Kit, less engine, instruments and covering AUD19,000 (2005).

DESIGN FEATURES: Strut-braced, high-wing cabin monoplane; wings fold rearwards for storage or transportation without disconnection of fuel lines or control runs. Quoted build time 350 hours.

Wing dihedral 2°.

FLYING CONTROLS: Conventional and manual via torque tubes and cables. Optional flaps.

STRUCTURE: Welded steel tube fuselage covered in Stitts fabric; glass fibre engine cowl and wingtips. Three alloy wing spars.

LANDING GEAR: Tailwheel type; fixed. Two faired-in side Vs hinged to lower longerons, plus half-axes, each with shock absorber, attached to compression frame. Steerable tailwheel. Wheels 6.00-6; disc brakes on main wheels.



Teknico Supa'Pup Mk IV with Jabiru 2200 engine (Paul Jackson)

1037938

POWER PLANT: One 34.0 kW (45.6 hp) Rotax 503 UL-IV two-cylinder two-stroke. Jabiru 2200, Rotax 582 and Subaru engines also suitable. Fuel contained in wing tanks, combined capacity 54 litres (14.3 US gallons; 11.9 Imp gallons); optional 90 litre (23.8 US gallon; 19.8 Imp gallon) wing tanks.

EQUIPMENT: Optional cargo pod under development.

DIMENSIONS, EXTERNAL:

Wing span 7.74 m (25 ft 4¾ in)
Length overall 5.70 m (18 ft 8½ in)
Height 1.67 m (5 ft 5¾ in)

DIMENSIONS, INTERNAL:

Cabin max width 0.61 m (2 ft 0 in)

AREAS:

Wings, gross 9.50 m² (102.3 sq ft)

WEIGHTS AND LOADINGS:

Weight empty 180 to 230 kg (397 to 507 lb)
Baggage capacity 20 kg (44 lb)
Max T-O weight 340 kg (750 lb)

PERFORMANCE:

Never-exceed speed (VNE) 130 kt (240 km/h; 149 mph)
Max level speed 100 kt (185 km/h; 115 mph)
Cruising speed 95 kt (176 km/h; 109 mph)
Stalling speed 36 kt (67 km/h; 42 mph)
Max rate of climb at S/L 335 m (1,100 ft)/min
T-O to 15 m (50 ft) 100 m (330 ft)
Endurance with 10% reserves, standard fuel 4 h 30 min

Austria

DIAMOND

DIAMOND AIRCRAFT INDUSTRIES GMBH

N A Otto-Strasse 5, A-2700 Wiener Neustadt

Tel: (+43 2622) 267 00

Fax: (+43 2622) 267 80

e-mail: office@diamond-air.at

Web: www.diamond-air.at

PRESIDENT: Christian Dries

MANAGING DIRECTORS:

Michael Feinig

Michael Goldschmidt

Christian Trieb

MARKETING DIRECTOR: Sylvia Mandl

SALES DIRECTOR: Dr Klaus Möller

HEAD OF DESIGN: Martin Volck

Company formed 1981 in Friesach, Carinthia, southern Austria, as Hoffman Flugzeugbau GmbH; re-formed after August 1984 bankruptcy as Hoffman Aircraft Ltd, subsidiary of Simmering-Graz-Pauker AG; relocated to new facility at Wiener Neustadt 1987; name HOAC Austria Flugzeugwerk Wiener Neustadt GmbH adopted 1990 after 1989 management buyout; renamed Diamond Aircraft Industries GmbH March 1996 and achieved JAR 21 design approval in 2001.

Factory expanded to 5,200 m² (56,000 sq ft) of floor space in 1996 to accommodate wider model range, increase production levels and provide new research and maintenance facilities. Current products include refurbished DA20 Katana. Diamond Aircraft Corporation produces the two-seat DA20 in Canada; the four-seat DA40 Star became available in 2000 and deliveries of production aircraft accelerated in 2001. DA40D certified and DA42 Twin Star launched in 2002, and D-JET announced in 2003.

Having achieved sales of 1,700 aircraft up to the end of 2000, Diamond gained a further 176 (including Canada) in 2001, 201 in 2002, 263 in 2003, 272 in 2004, and 415 in 2005.

Diamond acquired UK rotary engine manufacturer MidWest Engines in 1994, but acquisition not announced until Aero '03 show at Friedrichshafen in April 2003, under new company name Diamond Engines. Manufacturer of AE 50R Wankel-type rotary engine, with development of IAE 75R continuing in 2006.

Diamond opened a new 10,900 m² (117,000 sq ft) composites production centre at Wiener Neustadt on 23 January 2004 where components are manufactured to supply assembly lines in Austria and Canada, with potential to increase production to up to 600 aircraft per year. Austrian employees totalled 508 in 2005.

In April 2005, Diamond announced imminent establishment of a Chinese joint-venture scheduled to produce its first DA40 Diamond Star in mid-2006 at Binzhou factory which was inaugurated early October 2005.

DIAMOND HK36

European marketing name: Super Dimona

North American marketing name: Katana Xtreme

TYPE: Motor glider.

PROGRAMME: Original Hoffman H-36 Dimona (Diamond) was designed by Austrian-German team, first flight by first of three prototypes taking place in Germany 9 October 1980; production, in Austria, started May 1981; Dimona Mk II introduced May 1985 (smaller

wingtip fairings, modified cowling, better propeller pitch control, stronger main gear, sprung steerable tailwheel); production of H-36 totalled over 275 by 1989.

Development of HK36R Super Dimona (considerably redesigned by Dieter Kohler — hence K in designation) started March 1987; first flight, with 67.1 kW (90 hp) Limbach L 2400 engine, October 1989, and one or two more completed with Limbach engines, but Rotax 912 adopted as standard power plant. Production began April 1990 and Austrian certification to JAR 22 awarded 15 May 1990 to HK36 and 6 September 1990 to HK36R. Certification transferred to EASA on 21 December 2005. Manufacture totalled 114 by 1995, when supplanted by current versions. 'Short-wing' LF 2000 was proof-of-concept for DA20 Katana; TS and TTS versions introduced 1995 (certified 6 March 1996 and 20 December 1996, respectively), but discontinued two years later; these and current TC/TTC featured winglets; prototypes (OE-9415 and OE-9416) built 1995 certified 12 July and 20 December 1996, respectively. In 1997, export Dimonas for the North American market were renamed Katana Xtreme. Production temporarily halted in mid-2003; re-launched 2007 version has triangular window added each side, to rear of cockpit canopy.

Diamond Aircraft was selected in July 2003 to supply a Katana Xtreme airframe for the Boeing Fuel Cell Demonstrator project led by Boeing's Madrid-based Research and Technology Center. Work to integrate Proton Exchange Membrane fuel cells supplied by Intelligent Energy (UK) was scheduled to begin in the summer of 2003, with first flight expected in 2006.

CURRENT VERSIONS: **HK36TC 80:** Tricycle landing gear version of now discontinued HK 36TS. Some 20 TS/TC built in 1996, four in 1998 and eight for Indian Air Force in early 2000. No longer promoted.

HK36TC 100: As HK 36TC 80, but with Rotax 912S-3 engine.

HK36TTC 115: As HK 36TC 80 but with Rotax 914. Majority of production is this version. Eco version described separately.

HK36TTC-MPX: Described separately.

CUSTOMERS: Some 630 H/HK-36s built up to temporary closure of production line in mid-2003, including over 275 H-36s, 114 HK36Rs and 236 (including two prototypes) of T/TT series. Customers in Austria, Canada, Denmark, France (including five to air force in 2002), Germany, Netherlands, UK, US and elsewhere.

Prototype of re-started production version, OE-9510 (c/n 36800) exhibited at ILA, Berlin, May 2006, in advance of full launch in 2007.

COSTS: TC 80 EUR112,900; TC 100 EUR118,900; TTC 115 EUR123,700, ex-works, excluding taxes (all 2004).

DESIGN FEATURES: Conventional motor glider, with T tail and low/mid wing. Wings can be detached and, optionally, folded back alongside fuselage for transportation and storage. Improvements of T/TT series (from 1996) include carbon fibre main spar. Compared with H-36 Dimona, HK 36 has modified inboard leading-edge, sweptback wingtips and Schempp-Hirth (instead of DFS) type airbrakes; better access to engine and control system via completely removable cowlings; improved spin characteristics; stronger main landing gear and improved tailwheel springing; larger canopy with new mechanism; wingroot fairings and rear fuselage redesigned.

Wortmann wing section FX-63-137 at root.

FLYING CONTROLS: Conventional and manual. Longitudinal stability improved in Super Dimona over original by increasing elevator chord and adding trim tab; airbrakes in wing upper surface. Control surface deflections: ailerons +85 mm (3.35 in)/-42 mm (1.65 in); tailplane +60 mm (2.36 in)/-50 mm (1.97 in); rudder ±265 mm (10.43 in).

STRUCTURE: Mainly of GFRP; carbon fibre wing spar and main bulkhead. GFRP mainwheel legs and fairings.



Prototype '2007 Model' Diamond HK36 Super Dimona (a TC100 version) exhibited at Berlin in May 2006 (Paul Jackson)

1159368

LANDING GEAR: Non-retractable tricycle type, with free-castering nosewheel, $\pm 30^\circ$. Wheel fairings on all three legs.

POWER PLANT: TC 80: One 59.6 kW (79.9 hp) Rotax 912A-3 flat-four with 2.27:1 reduction drive to an MT-Propeller MTV-1-A/170-08 composites, two-blade, three-position constant-speed (hydraulic) and feathering propeller. Alternative fixed-pitch propellers (MT-170R-125-2A or Hoffman HO14-1705-123).

TC 100: One 73.5 kW (98.6 hp) Rotax 912S-3.

TTC 115: One 84.6 kW (113.4 hp) Rotax 914F-3.

Fuel tank in fuselage, capacity 80 litres (21.1 US gallons; 17.6 Imp gallons), of which 77 litres (20.3 US gallons; 16.9 Imp gallons) usable. Optionally, 55 litres (14.5 US gallons; 12.1 Imp gallons) gross.

ACCOMMODATION: Two seats side by side. Cockpit canopy hinged at rear to open upward. Baggage space aft of seats.

AVIONICS: Basic VFR as standard only. Optional avionics from Garmin.

Comms: Optional GMA 340 audio panel. SL 30 COM/NAV. SL 40 COM. GNC 250XL. COM/NAV/GPS or GNS 430 with glideslope. GTX 327 (Mode C) or GTX 330 (Mode S) transponder.

EQUIPMENT: Optional landing, position and anti-collision lights; optional glider towing hook or banner towing winch.

DIMENSIONS, EXTERNAL:

Wing span	16.33 m (53 ft 7 in)
Wing aspect ratio	17.4
Length overall	7.28 m (23 ft 10½ in)
Width, wings folded	2.20 m (7 ft 2½ in)
Height over tail	2.40 m (7 ft 10½ in)
Propeller diameter	1.70 m (5 ft 7 in)

AREAS:

Wings, gross	15.30 m² (164.7 sq ft)
--------------	------------------------

WEIGHTS AND LOADINGS:

Weight empty: TC 80, TC 100	555 kg (1,224 lb)
TTC 115	563 kg (1,241 lb)
Max baggage weight: all	12 kg (26 lb)
Max T-O weight: all	770 kg (1,697 lb)
Max towing load: TC 80	370 kg (815 lb)
TC 100	500 kg (1,102 lb)
TTC 115	600 kg (1,322 lb)
Max wing loading: all	50.3 kg/m² (10.31 lb/sq ft)
Max power loading: TC 80	12.92 kg/kW (21.23 lb/hp)
TC 100	10.48 kg/kW (17.21 lb/hp)
TTC 115	9.10 kg/kW (14.95 lb/hp)

PERFORMANCE, POWERED:

Never-exceed speed (VNE):	
all	141 kt (261 km/h; 162 mph)
Max cruising speed: TC 80	108 kt (200 km/h; 124 mph)
TC 100	116 kt (215 km/h; 134 mph)
TTC 115	119 kt (220 km/h; 137 mph)
Cruising speed at 65% power:	
TC 80	90 kt (167 km/h; 104 mph)
TC 100	100 kt (185 km/h; 115 mph)
TTC 115	106 kt (196 km/h; 122 mph)
Max rate of climb at S/L: TC 80	246 m (807 ft)/min
TC 100	294 m (965 ft)/min
TTC 115	324 m (1,063 ft)/min
T-O run: TC 80	201 m (659 ft)
TC 100	193 m (633 ft)
TTC 115	182 m (600 ft)
T-O to 15 m (50 ft): TC 80	338 m (1,110 ft)
TC 100	308 m (1,010 ft)
TTC 115	274 m (900 ft)
g limits: all	+5.3/-2.65

PERFORMANCE, UNPOWERED:

Best glide ratio: all	27
Min sink rate: all	1.20 m (3.94 ft)/s

DIAMOND HK36TTC-MPX

TYPE: Multisensor surveillance lightplane.

CURRENT VERSIONS: HK36TTC-MPX: Generic designation for sensor-equipped Dimona.

Developed by Diamond Aircraft Corporation in association with L-3 Wescam Inc of Ontario; multimission utility aircraft version of Diamond HK 36TTC Katana Xtreme. MPX (Multi Purpose Xtreme) incorporates hardpoint under each wing at approximately mid-span for quick-release sensor pods. Each pod can accommodate up to 45 kg (100 lb) of equipment, including gyro-stabilised video surveillance cameras (such as L-3 Wescam Model 16 ENG broadcast camera system) and IR sensors, with provision for onboard data



Canadian-converted HK36TTC-MPX now operated in Austria (Paul Jackson)

0580303



L-3 Wescam 16DB750 turret (Paul Jackson)

0580302

and image collection, or downlink telemetry. An independent 28 V 40 A DC power supply is provided for surveillance equipment, and a cockpit equipment bay, capacity 0.4 m³ (14 cu ft) or 30 kg (66 lb), accommodates rack-mounted electronics or instruments for in-flight monitoring. Standard fuel capacity of 110 litres (29.1 US gallons; 24.2 Imp gallons) provides endurance up to 7 hours.

HK36TTC-Eco: Specific designation for aircraft currently in service. Certified by Austrian ACG on 19 January 1999 and in FAA Utility category 29 March 1999 and Restricted category (aerial photography only) 21 December 2000; latter permits increased MTOW of 929 kg (2,050 lb). EASA certification (reconfirming ACG) on 21 December 2005.

Prototype OE-9481 currently operated (since 1998) in Switzerland by Met Air atmospheric sampling company as HB-2335. Five conversions undertaken in Canada for US market: N842WS, N845WS and N846WS operated by Diamond Aircraft; and N843WS and N844WS of Wescam Air Operations, Van Nuys, California.

Of these, N844WS became OE-9437 in Diamond (Austria) ownership and exhibited at ILA, Berlin, May 2004 with a 55 kg (121.3 lb) L-3 Wescam 16DB750 turret.

DIAMOND DA40D DIAMOND STAR

TYPE: Four-seat lightplane.

PROGRAMME: Formally launched 23 April 1997 at the Aero 97 show at Friedrichshafen, Germany, when mockup displayed; initially retained name of Katana; proof-of-concept prototype DA40-V1 (OE-VPC) first flew on 5 November 1997, powered by a Rotax 914 engine; a Teledyne Continental IO-240-engined DA40-V2 (OE-VPE) followed shortly thereafter; neither event was publicised; a third prototype, DA40-V3, with Textron Lycoming IO-360 engine, flew in late 1998; fourth, near-production standard, prototype (OE-VPM) joined the test programme in mid-1999 followed by three more prototypes comprising DA40-P5 (c/n 40005/OE-VPQ), -P6 (40006/OE-VPB), -P7 (40007/OE-VPW), these having enlarged ventral strake and cutaway rudder.

First production aircraft (40008/OE-KPN) registered June 2000; second exhibited at Farnborough in following month. Lycoming-powered variant was initial production version, for which JAR 23 certification was achieved 24 October 2000; FAA certification, 9 April 2001, followed by JAA IFR certification on 27 April 2001, and FAA IFR certification on 23 August 2001. First deliveries to US customers (seven aircraft) took place during EAA AirVenture 2001 at Oshkosh in July 2001. Chinese CAAC certification granted 26 October 2004.

Austrian production temporarily halted in early 2002 upon transfer of Lycoming-engined variant to Canada. Thielert-engined version now sole European-built DA40. This gained EASA certification on 28 September 2005, for new Garmin G1000 avionics suite.

CURRENT VERSIONS: **DA40-180**: Original version with Lycoming IO-360 engine; now produced by Diamond Canada (which see).

DA40-FP: Version of DA40-180 with fixed-pitch propeller. EASA certification achieved 14 April 2005, followed by FAA approval 27 July 2005.

DA40D: Marketed as DA40-TDI. Powered by Thielert Centurion 1.7 turbo diesel; converted prototype (OE-KPP) first flew 22 November 2001; JAR 23 N-VFR certification achieved 22 November 2002 followed by IFR approval on 18 June 2003. Development aircraft OE-VTA and 'VTB (80th and 84th Austrian-built). Initial batch comprised 75 aircraft; some 229 produced by end of 2005 for operators in Armenia, Australia, Austria, China, Denmark, France, Germany, Japan, Malaysia, Netherlands, New Zealand, Norway, Sweden, Switzerland, Thailand and UK. As described.

CUSTOMERS: Total of 170 DA40Ds ordered by mid-2004; Cabair of UK ordered 16, of which 12 received by mid-2004. The Amaury de la Grange pilot school at l'Épag de Merville, France, ordered six DA40Ds. Beijing PanAm International Aviation Academy ordered 41 DA40Ds with Garmin G1000 avionics in November 2004 of which four were delivered immediately and a further six in January 2005, and HM Aerospace of Langkawi, Malaysia has taken delivery of 16 DA40Ds for its training operation. Total of 207 delivered in 2005.

COSTS: DA40-TDI standard N-VFR EUR199,100; IFR from EUR242,829; DA40-TDI G1000 N-VFR EUR239,500, IFR from EUR266,524 (all 2005, excluding tax).

DESIGN FEATURES: Four-seat development of DA20; to be certified to FAR/JAR 23 or equivalents in Europe, North America, Russian Federation, South Africa and Turkey. DA



Garmin G1000 twin-screen avionics certified for Diamond Star in 2005

1151722

20 wings attach to new, wider centre-section to increase span; downturned tips to horizontal tail; single strake/tail bumper. Enlarged cabin increases fuselage length by 0.67 m (2 ft 2 1/4 in).

Wing section is Diamond-modified Wortmann FX 63-144-4-20.

FLYING CONTROLS: Conventional and manual. Ailerons and elevators operated by pushrods with low-friction bearings, rudder by cables; manual pitch trim standard, electric pitch trim optional via control stick-mounted switch; ground-adjustable trim tab on rudder; electrically actuated slotted flaps.

STRUCTURE: Fuselage, with integral vertical fin, is mostly of GFRP construction with local CFRP reinforcement in high-stress areas, comprising two half-shells bonded together. Two spar wings with GFRP/PVC foam/GFRP sandwich skins; horizontal tail and rudder surfaces similarly covered.

LANDING GEAR: Fixed tricycle type, with cantilever spring steel leg on each main unit and elastomeric suspension on nose leg. Mainwheel size 6.00-6; nosewheel 5.00-5. Steering is provided by differential braking of mainwheel and friction-damped castoring nosewheel. Speed fairings on all three wheels.

POWER PLANT: One 99 kW (133 hp) Thielert Centurion 1.7 turbo-diesel with FADEC, driving an MT-Propeller MTV-6-A/187-129 three-blade constant-speed propeller. Fuel in two wing tanks, standard capacity 114 litres (30.1 US gallons; 25.1 Imp gallons), of which 106 litres (28.0 US gallons; 23.3 Imp gallons) usable; optional long-range tank of 155 litres (40.9 US gallons; 34.1 Imp gallons) gross, 148 litres (39.1 US gallons; 32.6 Imp gallons) usable.

ACCOMMODATION: Four persons in two side-by-side pairs. Single-piece canopy lifts up and forwards for access to front seats; rear occupants board through an upward-opening door to port. Cabin has 26 g composites self-adapting comfort-gel foam seats of leather with fabric inlays with three-point automatic safety harnesses and roll-over bar. Baggage compartment behind rear seats includes tubular extension into rear fuselage for extra long items. Premium leather interior and rigid baggage compartment extension compartment, and ski tube (not with baggage compartment extension), all optional.

SYSTEMS: 14 V electrical system includes 90 A alternator; 12 V 35 Ah battery.

AVIONICS:

Integrated Garmin G1000 glass panel suite as core system.

Comms: Dual Garmin GIA 63 com/nav/GPS; GMA 1347 digital audio system; GTX 33 Mode S transponder (replaced by GTX 330 in optional IFR package).

Flight: Garmin GRS 77 AHRS; GDC 74 air data computer; GMU 44 triaxial magnetometer; GE4 71 airframe/engine interface unit. IFR package adds Honeywell KAP 140 dual-axis autopilot with optional altitude preselect, and integrated KN 63 remote DME.

Instrumentation: Dual Garmin GDU 1040 254 mm (10 in) displays for PFD and MFD functions with backup/standby mechanical ASI, altimeter, artificial horizon and compass. Options include Becker 3500 remote ADF and WX 500 Stormscope.

EQUIPMENT: Landing light, taxiing light, position lights, instrument lighting system, overhead cabin light, power socket for hand-held GPS and heated pitot/static system, lightning protection kit, gust lock, towbar, tools, pitot cover, fire extinguisher, and first aid kit, all standard. Noise reduction kit optional (mandatory in Austria, Germany and Switzerland).

DIMENSIONS, EXTERNAL:

Wing span 11.94 m (39 ft 2 in)



Thielert engine installation in Diamond Star (Jane's/Jamie Hunter)

1151724



Diamond DA40D Diamond Star (Jane's/Jamie Hunter)

1151725



Diamond DA40D Diamond Star equipped with early version of Garmin IFR suite (Jane's/Jamie Hunter) 1151723

Wing aspect ratio	10.53	C at 60% power	114 kt (211 km/h; 131 mph)
Length overall	8.00 m (26 ft 3 in)	A at 65% power	131 kt (243 km/h; 151 mph)
Height overall	1.97 m (6 ft 6 in)	B at 65% power	130 kt (240 km/h; 150 mph)
DIMENSIONS, INTERNAL:			
Baggage compartment: Length	1.08 m (3 ft 6½ in)	C at 70% power	125 kt (232 km/h; 144 mph)
Max width	0.35 m (1 ft 1¾ in)	B at 75% power	138 kt (256 km/h; 159 mph)
Max height	0.80 m (2 ft 7½ in)	C at 80% power	132 kt (244 km/h; 152 mph)
AREAS:			
Wings, gross	13.54 m² (145.7 sq ft)	Stalling speed, clean, all	52 kt (97 km/h; 60 mph)
Ailerons	0.65 m² (7.00 sq ft)	Max rate of climb at S/L: A	262 m (860 ft)/min
Flaps	1.56 m² (16.79 sq ft)	B	297 m (974 ft)/min
Horizontal tail	2.34 m² (25.18 sq ft)	C	169 m (554 ft)/min
Elevator	0.58 m² (6.24 sq ft)	T-O run: A	310 m (1,020 ft)
Fin	1.60 m² (17.22 sq ft)	B	350 m (1,150 ft)
Rudder	0.47 m² (5.06 sq ft)	C	335 m (1,100 ft)
WEIGHTS AND LOADINGS:			
Weight empty	735 kg (1,620 lb)	T-O to 15 m (50 ft): A	440 m (1,445 ft)
Baggage capacity	30 kg (66 lb)	B	550 m (1,805 ft)
Max T-O weight	1,150 kg (2,535 lb)	C	630 m (2,070 ft)
Max landing weight	1,092 kg (2,407 lb)	Landing from 15 m (50 ft): A	638 m (2,095 ft)
Max wing loading	84.9 kg/m² (17.40 lb/sq ft)	B	817 m (2,680 ft)
Max power loading	11.60 kg/kW (19.06 lb/hp)	C	750 m (2,460 ft)
PERFORMANCE (A: DA40-180; B: DA40FP; C: DA40D):			
Never-exceed speed (VNE), all	178 kt (329 km/h; 204 mph)	Landing ground roll: A	352 m (1,155 ft)
Max cruising speed, all	129 kt (239 km/h; 148 mph)	B	466 m (1,530 ft)
Cruising speed at FL100:		C	288 m (945 ft)
A at 45% power	107 kt (198 km/h; 123 mph)	OPERATIONAL NOISE LEVELS (JAR 36):	
A at 55% power	120 kt (222 km/h; 138 mph)	Standard exhaust	78.7 dB(A)
		OAM 40-096 exhaust	69.5 dB(A)



Instrument panel of DA40D 0532054

DIAMOND DA42 TWIN STAR

TYPE: Four-seat utility twin.
PROGRAMME: Prototype (then wearing D-GENI but not officially registered as such) shown statically at ILA Berlin, 6 to 12 May 2002. Although long reported, company decision to build was only made in November 2001, and assembly began in March 2002; DA42-V1 first flight (as OE-VPS) 9 December 2002; second prototype DA42-V2, OE-VDA, flew October 2003, total of 288 flight hours logged by late September 2004; third (and sixth) used for static testing only; DA42-P4 OE-VDB, first flown 29 April 2004, and shown at ILA, Berlin, May 2004, with total of 235 flight hours logged by late September 2004. EASA certification 13 May 2004; FAA FAR Pt 23 approval granted 22 July 2005. North American debut (DA42-P4) at EAA AirVenture Oshkosh, 27 July 2004 after transatlantic ferry flight from Wiener Neustadt 20 to 23 July via Scotland, Iceland, Greenland, Nunavut, Kuujuaq and London, Ontario, followed by nonstop 1,900 n miles (3,519 km; 2,186 mile) return ocean crossing from St John's, Newfoundland, to Porto, Portugal, in 12 hours, 30 minutes' flying time at average ground speed of 152 kt (282 km/h; 175 mph) and fuel burn of 10.86 litres (2.87 US gallons; 2.39 Imp gallons) per hour, per engine.
First delivery, of two aircraft (F-GJMT and F-GSIM) for French distributor Jacques Mattern, took place on 24 March 2005, followed by the first of 50 ordered by Diamond Aircraft UK.
CURRENT VERSIONS: **DA42-TDI Twin Star:** Thielert-powered version, as described. Manufacturing designation DA42D.
DA42-360 Twin Star: Conversion of DA42-V1 with 134 kW (180 hp) Textron Lycoming IO-360-M1A flat-sixes and Hartzell FC7495S two-blade propellers first flew on 16 April 2004. Also promoted as DA42L. Second prototype, newly-built OE-VDC, flew 18 December 2004; third (OE-VLC) shown at AirVenture, Oshkosh, July 2004. Production version with three-blade MT-Propeller composite propellers. Lycoming installation has air



Diamond DA42 Twin Stars in formation

1151708



Instrument panel of DA42 Twin Star with twin Garmin screens

1151707

intakes on each side of propeller hub. Fuel capacity 360 litres (95.0 US gallons; 79.2 Imp gallons) of which 340 litres (89.8 US gallons; 74.8 Imp gallons) usable. Max cruising speed 191 kt (354 km/h; 220 mph); max rate of climb at S/L 640 m (2,100 ft)/min; rate of climb at S/L OEI 91 m (300 ft)/min; max range 1,000 n miles (1,852 km; 1,150 miles). No production planned.

DA42 OPALE: Multipurpose aerial sensor platform (OPALE: Optional Piloted Surveillance and Reconnaissance System) version developed in conjunction with Rheinmetall Defence Electronics GmbH for reconnaissance, surveillance, inland or coastal border control, power plant and agricultural monitoring. Designed to be flown piloted or as UAV from ground control station/section control centre. Features nose/chin-mounted gyro-stabilised UOMZ SON 112 observation system; microwave LOS Broadband downlink with range of up to 108 nm (200 km; 124 miles), satellite uplink for command, control and payload data, and HF narrowband datalink for redundant command and a variety of task-specific sensors. Airframe modifications include enlarged downturned tailplane tips. At loiter speed of 65 kt (120 km/h; 75 mph) on-station time is up to 18 hours. Prototype OE-FDA (fifth DA42 airframe) first flew 12 May 2005.

CUSTOMERS: Total of 571 orders by late 2005, of which 215 are from customers in Europe and 356 from North America, including 10 for North American launch customer Embry-Riddle Aeronautical University for its Aviation & Space Technology Academy (ASTA) graduate first-officer training programme, an unspecified number for CTC McAlpine of the UK; one for Atlantic Flight Training of the UK delivered 17 June 2005; EPAG France has ordered four; Beijing PanAm International Aviation Academy has ordered 19, of which the first three were delivered 28 September 2005 after a ferry flight of 30 hours, 22 minutes duration. Total of 68 delivered in 2005, including aircraft for customers in France, the UK and US.

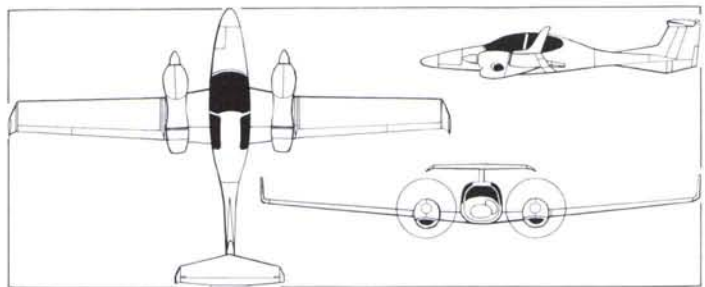
COSTS: EUR405,625 basically equipped (2005).

DESIGN FEATURES: Twin-engined version of DA40D Diamond Star; integral wing centre section replaced by a bolt-on centre section for wing of increased span; deeper floor provides increased headroom; front bulkhead (formerly firewall) moved forward. DA40 outboard wing panels with winglets; T tail; engine cowlings of large frontal area. Downturned tailplane tips. Enlarged rudder and fin dorsal fillet; underfin faired into rudder.

FLYING CONTROLS: Conventional and manual. Inset horn balance in ailerons. Flight-adjustable tabs on elevator (central) and rudder; ground-adjustable tab on port aileron. Slotted flaps outboard of engines; split flaps inboard; both electrically actuated.



Diamond DA42 OPALE prototype/demonstrator 1151706



Diamond DA42-TDI Twin Star (James Goulding) 1047849

STRUCTURE: Composites throughout. Generally as for DA40, but with increased use of carbon fibre for additional strength. Airframe certified for unlimited life, with first structural maintenance required after 6,000 flight hours.

LANDING GEAR: Triicycle type; electrohydraulically retractable. Nosewheel, with 5.00-5 tyre, retracts rearward and covered by single, starboard-hinged door; mainwheels, with 15x6.00 6 tyres and trailing-link configuration, retract inboard, having single part-door on legs, leaving wheel exposed after retraction. Oleo-pneumatic shock-absorbers on all legs. Hydraulic brakes. Floatplane version planned.

POWER PLANT: Two 99 kW (133 hp) Thielert Centurion 1.7 turbocharged diesel engines, each driving an MT-Propeller MTV-6-A/187-129 three-blade, variable-pitch (hydraulic) propeller. Single-lever control, with FADEC. Fuel tanks in wings, capacity 197 litres (52.0 US gallons; 43.3 Imp gallons), of which 189 litres (49.9 US gallons; 41.6 Imp gallons) usable; optional long-range capacity 104 litres (27.4 US gallons; 22.9 Imp gallons), of which 100 litres (26.4 US gallons; 22.0 Imp gallons) usable.

ACCOMMODATION: Four persons in two side-by-side pairs. Single-piece canopy lifts up and forwards for access to front seats; rear occupants board through an upward-opening door to port. Cabin has deluxe leather interior with 26 g composites self-adapting seats with three-point inertia reel safety harnesses, and roll-over bar. Baggage compartment behind seats includes tubular extension into rear fuselage for extra-long items. Baggage compartment extension similar to that of Canadian-built DA40, optional. Forward baggage compartment in nose with doors both sides. Air conditioning optional for DA42-360 from 2006.

SYSTEMS: Optional oxygen system. Electrical system 28 V with dual paralleling alternators (one per engine), each providing up to 60 A. Battery in nose; 11 Ah. Optional TKS fluid de-icing system for wing, tailplane, propellers and windscreen with approval (granted 16 December 2005) for flight into forecast or known icing conditions; weight 54 kg (118 lb); typical effectiveness 2.5 hours. Bendix/King KAP 140 autopilot.

AVIONICS: Garmin G1000 integrated avionics system as standard.

Comms: Dual Garmin GIA 63 com/nav/GPS/ILS, single GMA 1347 digital audio selector panel with marker beacon receiver and GTX 33 Mode S transponder with traffic information system (where available).

Flight: Bendix/King GRS 77, GMU 44 AHRS and terrain awareness system. Options include Bendix/King KN 63 DME, Becker RA 3502 ADF and L-3 WX-500 Stormscope.

Instrumentation: Two 254 mm (10 in) GDU 1040A (1,024 x 768 resolution) flat panel, sunlight readable, landscape format colour TFT screens.

EQUIPMENT: Landing light, taxiing light, position lights, instrument lighting system, overhead cabin light, heated pitot/static system, ANR headsets, gust lock, towbar, tools and pitot cover; fire extinguisher and first aid kit all standard.

DIMENSIONS, EXTERNAL:

Wing span	13.41 m (44 ft 0 in)
Wing aspect ratio	11.04
Length overall	8.53 m (28 ft 1 in)
Height overall	2.44 m (8 ft 2 in)
Propeller diameter	1.87 m (6 ft 1½ in)

AREAS:

Wings, gross	16.28 m² (175.3 sq ft)
Ailerons (total)	0.66 m² (7.10 sq ft)
Trailing edge flaps:	
slotted	1.34 m² (14.42 sq ft)
split	0.84 m² (9.04 sq ft)
Horizontal tail surfaces	2.35 m² (25.30 sq ft)
Elevators	0.66 m² (7.10 sq ft)
Vertical tail	2.43 m² (26.16 sq ft)
Rudder	0.78 m² (8.40 sq ft)

WEIGHTS AND LOADINGS:

Weight empty	1,250 kg (2,756 lb)
Max baggage weight:	
Nose	30 kg (66 lb)
Cockpit	45 kg (99 lb)
Baggage extension	18 kg (40 lb)
Max T-O weight (Utility)	1,785 kg (3,935 lb)
Max landing weight	1,700 kg (3,748 lb)
Max zero-fuel weight	1,650 kg (3,638 lb)
Max wing loading	109.6 kg/m² (22.45 lb/sq ft)
Max power loading	9.00 kg/kW (14.79 lb/hp)

PERFORMANCE:

Never-exceed speed (VNE)	194 kt (359 km/h; 223 mph)
Cruising speed: at FL100:	
at 50% power	127 kt (235 km/h; 146 mph)
at 60% power	138 kt (256 km/h; 159 mph)
at 70% power	148 kt (274 km/h; 170 mph)
at 80% power	156 kt (289 km/h; 179 mph)
at 90% power	163 kt (302 km/h; 188 mph)
at FL180:	
at 50% power	135 kt (250 km/h; 72 mph)
Stalling speed, flaps up	63 kt (117 km/h; 73 mph)
Max operating altitude	5,485 m (18,000 ft)
Max rate of climb at S/L	323 m (1,060 ft)/min
T-O run	427 m (1,400 ft)
T-O to 15 m (50 ft)	691 m (2,270 ft)
Landing from 15 m	710 m (2,330 ft)
Landing run	397 m (1,305 ft)
Range, 60% power at FL100:	
standard fuel	897 n miles (1,661 km; 1,032 miles)
with long range tank	1,275 n miles (2,361 km; 1,467 miles)

DIAMOND D-JET

TYPE: Private jet.

PROGRAMME: Development revealed in late 2002; initial details released 14 January 2003; first flight (C-GVLJ) at London, Canada, 18 April 2006; certification and deliveries planned for first quarter 2008. To be certified in standard and high maximum take-off weight versions for European and US markets, respectively. Final assembly of production aircraft to be in Canada. Seven-seat, twin-engine derivative under study in early 2003.

CUSTOMERS: Sales by July 2004 totalled more than 180.



Prototype Diamond D-Jet on its maiden flight 1158051

For details of the latest updates to *Jane's All the World's Aircraft* online and to discover the additional information available exclusively to online subscribers please visit jawa.janes.com



Diamond D-Jet prototype 1158052

COSTS: Unit cost less than USD1 million (2005).

DESIGN FEATURES: Low-wing of laminar flow aerofoil section with moderate sweepback and small winglets; T tail; engine inlets in wingroots.

STRUCTURE: Composites throughout.

POWER PLANT: One 6.23 kN (1,400 lb st) Williams International FJ33-4 turbofan, with FADEC. Fuel capacity 792 litres (209 US gallons; 174 Imp gallons) in EASA-certified version; 1,100 litres (291 US gallons; 242 Imp gallons) in FAA-certified version.

ACCOMMODATION: Five, including pilot(s), in two-plus-three seating configuration; pressurised cabin. Two cabin windows per side.

SYSTEMS: Pressurisation system, maximum differential 0.38 bar (5.5 lb/sq in) maintaining 2,440 m (8,000 ft) cabin environment to 7,620 m (25,000 ft). De-icing system standard. Ballistic Recovery Systems emergency parachute recovery system will be offered as option, deployable at speeds up to 300 kt (556 km/h; 345 mph).

AVIONICS: Garmin G1000 integrated avionics system comprising three-tube EFIS display with dual 254 mm (10 in) PFDs and single centrally mounted 381 mm (15 in) MFD. FMS controller, dual com/nav, integrated GFC 700 autopilot, glareshield mounted autopilot controller, dual audio panels, dual AHRS/GPS/magnetometer sensor system, and Mode S transponder.

DIMENSIONS, EXTERNAL:

Wing span	11.43 m (37 ft 6 in)
Length overall	10.69 m (35 ft 0¾ in)
Height overall	3.53 m (11 ft 7 in)

DIMENSIONS, INTERNAL:

Cabin: Length	3.53 m (11 ft 7 in)
Max width	1.47 m (4 ft 10 in)
Max height	1.47 m (4 ft 10 in)

WEIGHTS AND LOADINGS (A: EASA certification; B: FAA certification):

Weight empty: A, B	1,175 kg (2,590 lb)
Max payload	499 kg (1,100 lb)
Max fuel weight	789 kg (1,739 lb)

Payload with max fuel: A	179 kg (395 lb)
B	229 kg (505 lb)
Max T-O weight: A	1,999 kg (4,407 lb)
B	2,300 kg (5,070 lb)
PERFORMANCE (estimated):	
Max operating speed	295 kt (546 km/h; 339 mph)
Cruising speed: max at FL250	315 kt (583 km/h; 363 mph)
Long range cruising speed	240 kt (444 km/h; 276 mph)
Stalling speed: A	61 kt (113 km/h; 71 mph)
B	63 kt (117 km/h; 73 mph)
Time to FL250	15 min
Service ceiling	7,620 m (25,000 ft)
Max range: A	1,012 n miles (1,874 km; 1,164 miles)
B	1,351 n miles (2,502 km; 1,554 miles)

DIAMOND DA50 SUPER STAR

TYPE: Five-seat lightplane.

PROGRAMME: On 15 December 2006, Diamond allowed guests to its plant an 'unofficial' view of the DA50 Super Star, which appears to be a five-seat version of the DA40 Diamond Star. Diamond noted only that the aircraft would employ "various gasoline and Diesel" engines up to 261 kW (350 hp). The prototype appears to have a Thielert 4.0 Diesel of that power and a four-blade, scimitar propeller by MT-Propeller. The T tailplane has the downturned tips found on the DA42.



First photograph released of the Diamond DA50 Super Star 1158905

HB FLUGTECHNIK

HB FLUGTECHNIK GMBH
Dr Adolf Schärff Strasse 42, Postfach 74, A-4053 Haid-Ansfelden
Tel: (+43 7229) 79 10 40
Fax: (+43 7229) 791 04 15
e-mail: info@hb-flugtechnik.at
Web: www.hb-flugtechnik.at
MANAGING DIRECTOR: Ing Heino Brditschka
TECHNICAL DIRECTOR: Georg Passenbrunner

FACTORY AIRFIELD:
Flugplatz Hofkirchen
A-4491 Hofkirchen

Company name indicates Heino Brditschka, designer of motor gliders, including the HB 23 and HB 202. Both had the unconventional mid-fuselage propeller, to which HB Flugtechnik has returned for some of its recent projects.

From its 2,400 m² (25,830 sq ft) factory, HB provides a wide variety of other aviation services, including overhaul and repair, aerial photography and advertising, flying training, aircraft charter and support of amateur constructors. In 1998, distribution of HB 207 kits was assigned to Aero-Service Thüringen of Erfurt, Germany, but this has now ceased.

In 2002, HB announced that it was working on more projects, including the **HB 401** high-wing pusher; **HB 402** high-wing design resembling Cessna 172; and **HB 403**, based around the company's Alfa; work was continuing during 2004, but nothing reported subsequently.

The company also markets the Amigo, Cubby and Dandy ultralights produced by Tomáš Podesva in the Czech Republic.

HB FLUGTECHNIK HB 207 ALFA

TYPE: Side-by-side kitbuilt.

PROGRAMME: First flight (HB 207RG OE-CHC) 14 March 1995. Second prototype (HB 207 OE-CAA) made public debut, unmarked and then unflown, at Aero '97 at Friedrichshafen, April 1997. Certified to JAR-VLA.

CURRENT VERSIONS: **HB 207:** Fixed landing gear version.

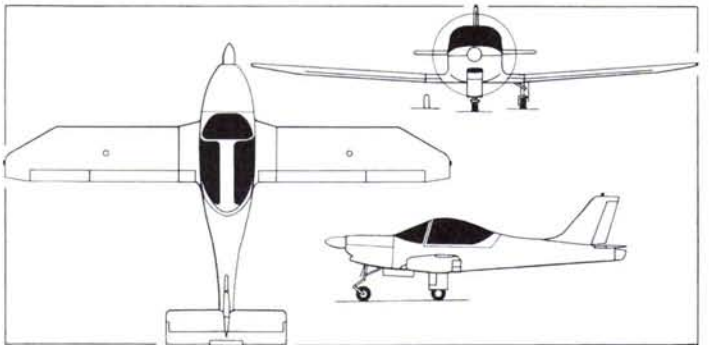
HB 207RG: Retractable landing gear version. Empty weight 498 kg (1,098 lb), MTOW 750 kg (1,653 lb); cruising speed at 75 per cent power 140 kt (259 km/h; 161 mph); service ceiling 4,570 m (15,000 ft); T-O run 340 m (1,115 ft), or 440 m (1,445 ft) to 15 m (50 ft); range 809 n miles (1,500 km; 932 miles).

CUSTOMERS: Total 85 sold in Austria, Brazil, Czech Republic, France, Germany, Lithuania, Sweden, Switzerland, United Kingdom and USA by April 2001; at least 70 completed by late 2005.

COSTS: Standard aircraft fast-build kit, no engine, propeller or avionics EUR22,500 (2005).



Rotax-engined version of fixed-gear HB 207 Alfa (Paul Jackson) 1158436



HB Flugtechnik HB-207RG Alfa (Volkswagen engine) (Paul Jackson) 1158442

DESIGN FEATURES: Quoted build time 1,000 hours. Constant chord low wings with raked tips; slightly sweptback fin and rudder; one-piece elevator aft of vertical tail. Airframe features derigging and rigging guide points for road transport or storage.

FLYING CONTROLS: Conventional and manual. Ailerons and elevator actuated by pushrods; rudder by cables. Large central trim tab in elevator. Manual (optionally electric) operation for flaps.

STRUCTURE: Mainly metal primary structure with GFRP skin; moving surfaces have Ceconite covering.

LANDING GEAR: HB 207RG has retractable tri-cycle type, with size 4.00 4 tyre on each unit. Main units have brakes and rubber-in-compression shock-absorption, and retract inward; nosewheel retracts rearward. HB 207 has fixed tri-cycle type with 5.00-5 tyres plus streamlined fairings and spats on each unit.

POWER PLANT: Standard engine is an 80.9 kW (108.5 hp) VW Porsche HB 2400 G/2 flat-four based on that of Porsche 911 sports car; alternatives include 59.6 kW (79.9 hp) Rotax 912 A, 73.5 kW (98.6 hp) Rotax 912S and 84.5 kW (113.3 hp) Rotax 914, or Limbach or Textron Lycoming engines up to 119 kW (160 hp). Rotax versions have elongated engine cowling. Geared drive to choice of propellers: two-blade wooden fixed pitch, three-blade adjustable- or variable-pitch, or (as on prototypes) five-blade adjustable- or variable-pitch. Fuel tank in each wing, combined capacity 100 litres (26.4 US gallons; 22.0 Imp gallons).

ACCOMMODATION: Rearward-sliding fully transparent canopy.

SYSTEMS: Electrical system: 200 A 15 Ah (optionally 20 Ah) battery; 14 V 75 A alternator.

AVIONICS: *Comms:* Honeywell 760-channel KX 155 transceiver, KT 76A transponder and ELT optional.

Flight: Honeywell KX 125 VOR with KI 208 indicator optional.

Instrumentation: VFR flight and engine transmission instrumentation standard.

DIMENSIONS, EXTERNAL:

Wing span	9.00 m (29 ft 6 1/4 in)
Wing aspect ratio	8.5
Length overall	5.95 m (19 ft 6 1/4 in)
Height overall	1.95 m (6 ft 4 3/4 in)

DIMENSIONS, INTERNAL:

Cabin: Length	1.94 m (6 ft 4 1/2 in)
Max width	1.10 m (3 ft 7 1/4 in)
Max height	0.97 m (3 ft 2 1/4 in)

AREAS:

Wings, gross	9.50 m ² (102.3 sq ft)
Vertical tail surfaces (total)	0.65 m ² (7.00 sq ft)
Horizontal tail surfaces (total)	1.68 m ² (18.08 sq ft)

WEIGHTS AND LOADINGS (U: Utility, N: Normal category):

Weight empty: U, N	450 kg (992 lb)
Max T O weight: U	700 kg (1,543 lb)
N	750 kg (1,653 lb)
Max wing loading: U	67.4 kg/m ² (13.80 lb/sq ft)
N	73.7 kg/m ² (15.09 lb/sq ft)
Max power loading:	
VW-Porsche HB 2400 G/2	8.66 kg/kW (14.22 lb/hp)
Rotax 912 A	11.75 kg/kW (19.31 lb/hp)

PERFORMANCE (HB 2400 engine, U and N as above):

Never-exceed speed (VNE): U, N	166 kt (309 km/h; 192 mph)
Cruising speed: U	132 kt (245 km/h; 152 mph)
N	130 kt (240 km/h; 149 mph)
Stalling speed:	
flaps up: U	51 kt (93 km/h; 58 mph)
N	53 kt (98 km/h; 61 mph)
30° flap: U	46 kt (84 km/h; 53 mph)
N	47 kt (87 km/h; 55 mph)
Max rate of climb at S/L: U	330 m (1,082 ft)/min
N	300 m (984 ft)/min
Service ceiling	4,265 m (14,000 ft)
T-O run: U	190 m (625 ft)
N	210 m (690 ft)
T-O to 15 m (50 ft): U	300 m (985 ft)
N	320 m (1,050 ft)
Landing run: U	153 m (500 ft)
Range: U, N	647 n miles (1,200 km; 745 miles)
g limits: U	+4.4/-2.2
N	+3.8/-1.9

HB FLUGTECHNIK AMIGO, CUBBY AND DANDY

TYPE: Tandem-seat ultralight/kitbuilt; side-by-side ultralight/kitbuilt.

PROGRAMME: Introduced to HB range in 2002 as modular range, based on Podesva series of Piper Cub lookalikes produced in Czech Republic. Differences include the following:

CURRENT VERSIONS: **Amigo:** Side-by-side version of modern appearance, with nosewheel, short-span wings, square-topped fin and cut-down rear decking. Option of increased engine power. Manufacturer's designation **TUL.03**. Prototype (later D-MBHB) shown at Aero '03, Friedrichshafen, 24-27 April 2003.

Cubby: Tandem-seat, tailwheel layout, most resembling classic J3 Cub. Manufacturer's designation **TUL.02**.

Dandy: As Cubby, but side-by-side seating.

COSTS: Amigo kit EUR14,900 without engine; EUR41,500 flyaway with Rotax 912; Cubby kit EUR13,900 without engine; EUR39,900 flyaway with Rotax 912, all plus tax (2006).



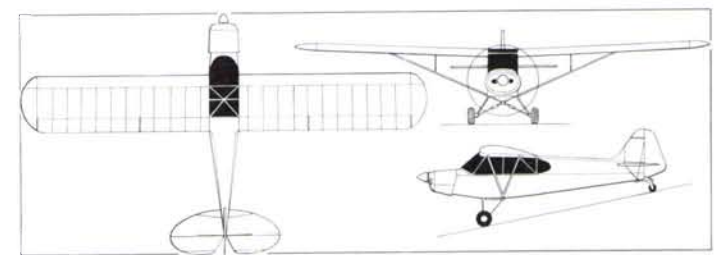
HB Flugtechnik Cubby

1037915



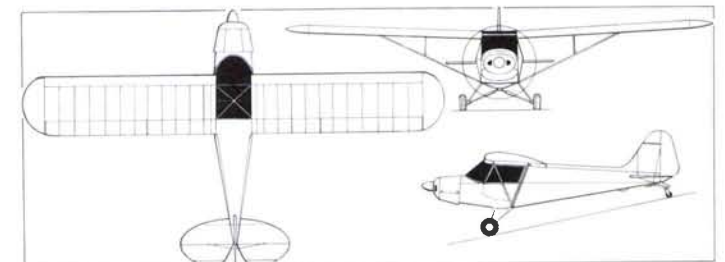
HB Flugtechnik Dandy

1037916



Cubby representative of Piper J3 Cub (James Goulding)

0547521



HB Flugtechnik Dandy side-by-side ultralight (James Goulding)

0547520

FLYING CONTROLS: Conventional and manual. All models have plain flaps and flight-adjustable trimmer in each elevator.

STRUCTURE: Amigo has metal tube, fabric-covered lower fuselage and strut-braced wings, latter with composites tips and leading edge; metal fin fillet, braced tailplane. Cubby and Dandy have metal tube fuselage with fabric covering aft of cabin and metal sheet forward, fabric-covered wooden wings.

LANDING GEAR: **Amigo:** Nosewheel type; fixed. Fuselage-mounted, spring composites cantilever mainwheel legs, 4.00-6 mainwheels with cable-operated drum brakes; 4.00-4 nosewheel. Tail bumper.

Cubby/Dandy: Tailwheel type; fixed. Two faired-in side Vs hinged to lower longerons, plus half-axes, each with shock-absorber, attached to compression frame, 15x6.00-6 mainwheels and solid tailwheel.

POWER PLANT: One 59.6 kW (79.9 hp) Rotax 912 UL with two-blade propeller standard. Amigo option of 73.5 kW (98.6 hp) Rotax 912 ULS and two-blade ArPlast variable-pitch



HB Flugtechnik Amigo

1037911

propeller, Fuel tank behind cockpit; capacity 60 litres (15.8 US gallons; 13.2 Imp gallons) in all versions with option to increase to 90 litres (23.8 US gallons; 19.8 Imp gallons) in Cubby.

EQUIPMENT: Amigo has optional ballistic parachute.

DIMENSIONS, EXTERNAL (A: Amigo, C: Cubby, D: Dandy):

Wing span: A	9.00 m (29 ft 6¼ in)
C	9.90 m (32 ft 5¾ in)
D	9.60 m (31 ft 6 in)
Length overall: A	5.70 m (18 ft 8½ in)
C, D	5.60 m (18 ft 4½ in)
Height overall: A	2.20 m (7 ft 2½ in)
C, D	2.00 m (6 ft 6¾ in)

AREAS:

Wings, gross: A	11.80 m² (127.0 sq ft)
C	13.00 m² (139.9 sq ft)
D	12.80 m² (137.8 sq ft)

WEIGHTS AND LOADINGS:

Weight empty: A, C	265 kg (584 lb)
D	260 kg (573 lb)
Max T-O weight: all	450 kg (992 lb)
where allowed	472.5 kg (1,041 lb)

PERFORMANCE:

Never-exceed speed (VNE): A	102 kt (190 km/h; 118 mph)
C, D	91 kt (170 km/h; 105 mph)
Normal cruising speed: A	86 kt (160 km/h; 99 mph)
C, D	81 kt (150 km/h; 93 mph)
Stalling speed: A	30 kt (55 km/h; 35 mph)
C, D, flaps down	27 kt (50 km/h; 31 mph)
Max rate of climb at S/L	300 m (984 ft)/min
T-O run: A	70 m (230 ft)
C, D	60 m (200 ft)
g limits	+6/-4

Belgium

DYNALI

DYNALI SA HELICOPTERES

Dynali SA Hélicoptères
10 rue de la Science, B-1400 Nivelles
Tel: (+32 67) 55 29 98
Fax: (+32 67) 84 05 31
e-mail: info@dynali.com
Web: www.dynali.com
SALES MANAGER: M Michau

As well as supplying kits and flyaway helicopters, Dynali also offers builder assistance at its Nivelles factory. Distributors have been appointed in France, Spain and South Africa.

DYNALI H2

TYPE: Two-seat ultralight helicopter kitbuilt.
PROGRAMME: Prototype (registered in France as F-PHII) formally revealed 11 May 2004; flew later that year and exhibited at several trade shows; new design of main blade (replacing aluminium unit supplied by Air Copter) added in early 2005; testing satisfactory, but by May 2005 plans in hand for replacement of original Rotax 914 engine by higher-powered Subaru.
COSTS: Kit EUR90,000 (2006).
DESIGN FEATURES: Small, moderately-priced helicopter with option of home- or factory-assisted assembly to meet JAR 27 VLR regulations. Airframe designed for progressive deformation in the event of accident. Flight controls as for larger helicopters, allowing representative training. Safety features include oil contamination, and oil and water level warnings.



Prototype Dynali H2 two-seat helicopter (Paul Jackson)

1037942

Conventional layout with two-blade Vitec Aerospace main rotor and eight-blade Duc Helice Fenestron-type tail rotor. Main rotor 530 rpm. Fixed horizontal tailplane with end fins.

Main rotor blade section NACA 23015.

STRUCTURE: Welded stainless steel tube cabin structure with Kevlar skin; carbon fibre tailboom. Composites main rotor blades and aluminium tail rotor. Polyurethane foam fillings. Aluminium skids.

LANDING GEAR: Skid-type; fixed. Three attachment points each side.

POWER PLANT: One flat-four piston engine with belt drive to rotors. Initially 84.5 kW (113.3 hp) Rotax 914; to be replaced by Subaru EJ25 derated to 123 kW (165 hp). Fuel capacity 80 litres (21.1 US gallons; 17.6 Imp gallons).

ESQUAL.COM

ESQUAL.COM NV

Steenkuijstraat 20, B-3800 Saint-Truiden
e-mail: esqual@esqual.be
Web: www.esqual.com

Esqual ultralight developed by Vol Mediterrani of Spain. Programme transferred in March 2006 to Belgium: new manufacturing facilities to be established at the former military air base of Brustem, near Saint-Truiden, subject to planning permission.

ESQUAL.COM VM-1 ESQUAL

English name: Shark

TYPE: Side-by-side ultralight/kitbuilt; two-seat lightplane.

PROGRAMME: Prototype EC-YZZ flown 2000 by designers, Vol Mediterrani at 'Les Umbertes' aerodrome, Moia. UK debut at PFA Rally, Cranfield, June 2002 (demonstrator EC-ZFF). Programme transferred to Belgium in 2006, coincident with adoption of AN (USA) hardware sizes and Matco wheels and brakes.

CURRENT VERSIONS: **VM-1:** Original version. Initial 73 aircraft, built up to mid-2003. Wing span 9.25 m (30 ft 4 1/4 in); length 5.86 m (19 ft 2 3/4 in).

From 74th aircraft onwards, has wider chord ailerons and smaller wingtip fairings for slightly reduced span. Prototype was EC-ZFX fitted with new wing, including fixed landing gear.

VM-1C: 'Carbon' version of VM-1, adding carbon fibre main spar, electric elevator trim and dual controls.

VM-1P: At least two VM-1s registered in Portugal.

Esqual Sport: Marketed by Esqual North America LLC (www.esqualna.com) for LSA category: Jabiru 3300 engine and Sensenich W64ZK-51 propeller.

Fixed gear: Nosewheel landing gear. Fuselage-mounted spring composites mainwheel legs and trailing-link nosewheel, all with wheel fairings. Mainwheels 3.50-6; nose 4.00-4. *As described.*

Retractable gear: Tailwheel type. Retractable mainwheels; fixed tailwheel with speed fairing. Prototype EC-ZFX had flown by mid-2002. Max level speed (Jabiru 3300 engine) 200 kt (370 km/h; 230 mph). Wing span approx 8.23 m (27 ft 0 in); wing area 7.90 m² (85.0 sq ft). At least two built by 2005.

CUSTOMERS: More than 90 built and 100 sold by early 2005.

COSTS: Kit less engine and instruments: VM-1 EUR30,068, VM-1C EUR34,025. US kit delivery charge USD1,700. Rotax flyaway: VM-1 EUR61,387, VM-1C EUR65,344. Jabiru 2200 flyaway: EUR55,993 and EUR59,950; Jabiru 3300 flyaway: EUR61,387 and EUR65,344. All prices not including tax (2006).

DESIGN FEATURES: High-performance ultralight with low landing speed achieved by refinement of wing design. Low-mounted, tapered wing and mid-tailplane. Sweptback fin. No composites work required for assembly.

FLYING CONTROLS: Conventional and manual; ailerons and elevator pushrod actuated. Variable incidence (electric) tailplane for trim. Slotted flaps; maximum deflection 45°; flaps also deflect upwards to optimise cruising speed.



Esqual.com VM-1 Esqual flown in USA (Paul Jackson)

1159168

DIMENSIONS, EXTERNAL:

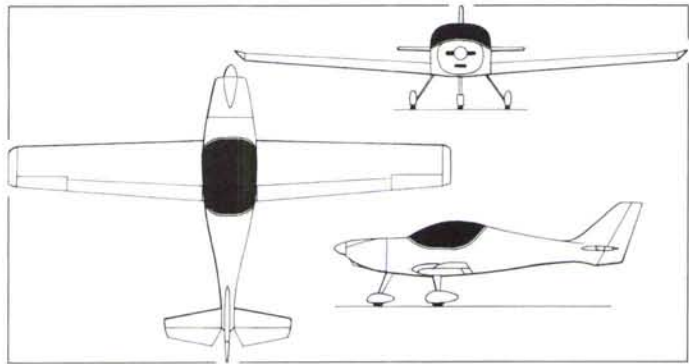
No details announced

WEIGHTS AND LOADINGS:

Weight empty 420 kg (926 lb)
Max T-O weight 685 kg (1,510 lb)

PERFORMANCE:

Never-exceed speed (VNE) 102 kt (190 km/h; 118 mph)
Max operating speed 89 kt (165 km/h; 103 mph)
Endurance 4 h



Vol Mediterrani VM-1 Esqual side-by-side kitbuilt (Paul Jackson)

1159131

STRUCTURE: Glass fibre monocoque fuselage with integral fin; cockpit area reinforced. Steel tube centre-section. Wing main spar of carbon fibre or glass fibre (according to customer's choice; latter with 10 kg; 22 lb weight saving), with secondary trailing-edge spar and glass fibre sandwich skin.

LANDING GEAR: As described under Current Versions. Hydraulic brakes.

POWER PLANT: Option of 73.5 kW (98.6 hp) Rotax 912 ULS (standard) or 59.7 kW (80 hp) Jabiru 2200 flat-four or 89 kW (120 hp) Jabiru 3300 flat-six; last-mentioned adds 8.5 kg (19 lb) to empty weight. Warp Drive three-blade ground-adjustable pitch propeller standard. Airmaster propeller optional. Fuel in two wing tanks, combined capacity 100 litres (26.4 US gallons; 22.0 Imp gallons).

EQUIPMENT: Optional Galaxy ballistic parachute.

DIMENSIONS, EXTERNAL:

Wing span 9.10 m (29 ft 10 1/4 in)
Length overall 6.08 m (19 ft 11 1/2 in)
Height overall 1.94 m (6 ft 4 1/2 in)

DIMENSIONS, INTERNAL:

Cabin max width 1.10 m (3 ft 7 1/4 in)

AREAS:

Wings, gross 9.20 m² (99.0 sq ft)

WEIGHTS AND LOADINGS (Rotax 912 ULS and glass fibre wing spar):

Weight empty 275 kg (606 lb)
Max T-O weight: Ultralight 450 kg (992 lb)
LSA 567 kg (1,250 lb)

PERFORMANCE (Ultralight; Rotax 912 ULS and three-blade propeller; J2200 and J3300, fixed-pitch, where different):

Max level speed: Rotax 146 kt (270 km/h; 168 mph)
J2200 124 kt (230 km/h; 143 mph)
J3300 148 kt (275 km/h; 171 mph)

Cruising speed at 75% power:

Rotax 135 kt (250 km/h; 155 mph)
J2200 113 kt (210 km/h; 130 mph)
J3300 132 kt (245 km/h; 152 mph)

Stalling speed, flaps down 35 kt (64 km/h; 40 mph)

Max rate of climb at S/L: Rotax 549 m (1,800 ft)/min
J2200 305 m (1,000 ft)/min
J3300 457 m (1,500 ft)/min

T-O run: Rotax 95 m (315 ft)
J2200 130 m (430 ft)
J3300 105 m (345 ft)

Landing run 95 m (315 ft)

Range 567 n miles (1,050 km; 652 miles)
g limits +9/-3 (ultimate)

LAMBERT

LAMBERT AIRCRAFT ENGINEERING BVBA

Hangar 59, Vliegvelde Wevelgem, B-8560 Wevelgem
Tel: (+32 56) 43 16 26
Fax: (+32 56) 43 16 29
e-mail: info@lambert-aircraft.com
Web: www.lambert-aircraft.com
DIRECTOR: Filip Lambert

In late 1995 Filip Lambert, a student at the College of Aeronautics, Cranfield, UK, was named one of three joint winners of the Royal Aeronautical Society Light Aircraft Design Competition with his Mission M212-100. Lambert Aircraft Engineering was formed in 1996 and the prototype mission M212-100 was fabricated in Belgium with the assistance of Steven Lambert and the original intention of undertaking test flying at Koksijde air force base, where the company planned to build a 3,000 m² (32,290 sq ft) production facility during the first half of 2004; production scheduled to start in the second half of 2004, when extra staff employed, although a maiden flight did not take place until mid-2004; factory facilities have been built at Wevelgem rather than Koksijde. In September 2003 the workforce numbered three.

LAMBERT MISSION M106

TYPE: Side-by-side ultralight.

PROGRAMME: Prototype built in Slovak Republic circa 2003, unannounced; registered OM-M666 and named Tuciak (penguin); based at Lambert company aerodrome at Wevelgem since early 2004; second prototype (59-COP/F-JPQX) with redesign and new engine made first flight from there 18 November 2005; prototype Tuciak moved to Moorsele, Belgium, but with French registration 59-COQ and call-sign FJPQS. Formally announced at PFA Flying for Fun, Kemble, UK, 1 July 2005. Production of initial batch of eight started December 2005 in Slovak Republic with final assembly in Belgium; type certificate awarded 3 April 2006 by Belgian CAA.

COSTS: EUR36,900 flyaway (2006).

DESIGN FEATURES: High, constant-chord wing braced to lower longerons by circular-section V struts and auxiliary strut each side; sweptback fin and mid-mounted tailplane. Original landing gear of side Vs and half-axes replaced prior to launch by cantilever type; Volkswagen and Rotax engines initially flown and found to be unsatisfactory; replaced by UL260i.

FLYING CONTROLS: Conventional and manual. Balanced ailerons and flaps, both operated by pushrods. Plain-hinged elevator and rudder: former cable-actuated; latter operated by pushrods and with flight-adjustable trim tab to port.



Views of second Lambert Mission M106 1158439

STRUCTURE: Welded steel alloy tube fuselage and empennage, both with fabric covering; fabric-covered wing built on dual tubular aluminium spars.

LANDING GEAR: Fixed; tailwheel type standard; nosewheel type optional. Fuselage-mounted, spring glass fibre cantilever mainwheel legs with optional fairings. Mainwheels 14x4 with hydraulic disc brakes; steerable tailwheel 200x50.

POWER PLANT: One 61.1 kW (82 hp), FADEC-controlled UL Power UL260i flat-four, directly driving a two-blade (optionally three-blade) wooden, fixed-pitch propeller. Option of 59.6 kW (79.9 hp) Rotax 912 or 73.5 kW (98.6 hp) Rotax 912S. Composites fuel tanks in wings and header tank in fuselage; total capacity 70 litres (18.5 US gallons; 15.4 Imp gallons) of which 64 litres (16.9 US gallons; 14.1 Imp gallons) usable.

AVIONICS: Dynon Avionics D-10A EFIS and EMS-D10 standard. Optional Avmap EKPIV moving map display

EQUIPMENT: Optional ballistic recovery parachute.

DIMENSIONS, EXTERNAL:

Wing span	9.32 m (30 ft 7 in)
Length	5.65 m (18 ft 6½ in)
Height overall: tailwheel	1.80 m (5 ft 10¾ in)
nosewheel	1.95 m (6 ft 4¾ in)

AREAS:

Wings, gross	11.80 m² (127.01 sq ft)
--------------	-------------------------

WEIGHTS AND LOADINGS:

Weight empty	260 kg (573 lb)
Max T-O weight:	450 kg (992 lb)
where allowed	495 kg (1,091 lb)

PERFORMANCE:

Never-exceed speed (VNE)	113 kt (210 km/h; 130 mph)
Max operating speed	100 kt (185 km/h; 115 mph)
Normal cruising speed	85 kt (157 km/h; 98 mph)
Stalling speed, flaps down	35 kt (65 km/h; 41 mph)
Max rate of climb at S/L	305 m (1,000 ft)/min
T-O run	110 m (361 ft)
Range at 75% power	351 n miles (650 km; 403 miles)

LAMBERT MISSION M212

TYPE: Four-seat kitbuilt.

PROGRAMME: Design started November 1992; fuselage mockup completed July 1993; construction of proof-of-concept prototype began at Geluvel, Belgium, January 1996; structural test programme completed 23 December 1998; prototype, M212-100 registered G-XFLY in February 2000, was structurally complete by March 2001; all composites work and landing gear completed November 2001; power plant and fuel system work began March 2002 in UK. Public debut in UK at PFA Rally, Cranfield, 21–23 June 2002. First flight planned for December 2002, but not achieved until 13 July 2004 at Cranfield. Popular Flying Association approval achieved 13 April 2005. Kit production delayed by priority given to M106, but eventually launched in late 2006.

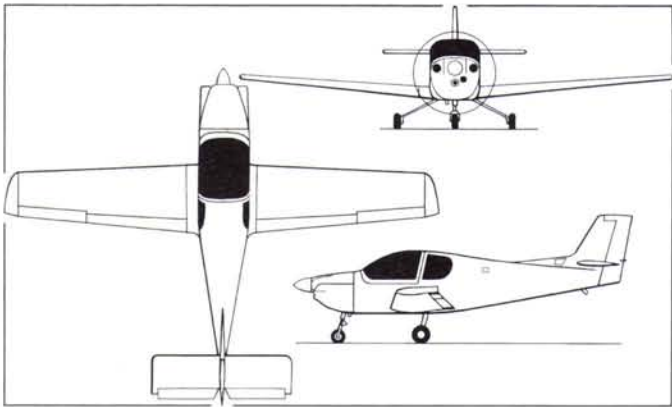
CURRENT VERSIONS: Family of aircraft planned around core four-seat version.

M212-100: Prototype. One only.

M212-200: Basic four-seat version; will be available factory-built or as kit; certification to JAR/FAR Pt 23 planned.



Prototype Lambert Mission M212 1037917



Lambert Mission M212 (Paul Jackson) 1159815

M212-300: Proposed two-seat aerobatic trainer; since discontinued.

M212-400: Four-seat tourer with increased fuel and baggage capacity, optional retractable landing gear, maximum take-off weight 1,100 kg (2,425 lb) and range of over 1,000 n miles (1,852 km; 1,151 miles).

M216: Proposed retractable landing gear version.

CUSTOMERS: Six orders for M212-200 and options on 20 M212-200 and -400 kits held in September 2003; customers in the Benelux countries, France and, mostly, the UK. By mid-2005, first batch of five aircraft under construction.

COSTS: Kit, excluding engine, propeller and VFR avionics, EUR59,900 (2006).

DESIGN FEATURES: Designed using CAD and wind tunnel research facilities; will meet FAR Pt 23 and JAR 23 certification criteria. Low-wing monoplane; wings, which have laminar flow, moderate taper and upturned tips. Wing dihedral 5°; incidence at root 2°; twist 2°. Quoted kit build time 800 hours.

FLYING CONTROLS: Conventional and manual. Cable and pushrod actuation. Electrically actuated single-slotted flaps.

STRUCTURE: All-composites, with extensive (95 per cent by weight) use of prepregs; glass and carbon in epoxy resin used for spars and longerons. Fuselage of monocoque construction; wing has dual main spars plus auxiliary spar for further strengthening.

LANDING GEAR: Fixed tricycle type. Mainwheels size 6.00–6, nosewheel 5.00–5 or 6.00–6; Cleveland brakes. Steerable nosewheel, maximum steering angle ±50°. Potential for development of retractable version (tailwheel option withdrawn).

POWER PLANT: Prototype fitted with second-hand 112 kW (150 hp) Textron Lycoming O-320-E2D flat-four; MT-Propeller MTV-18-C/175–17d three-blade, constant-speed (electric) propeller; and Gomolzig twin-muffler exhaust; other options include the 134 kW (180 hp) Superior XP-360 and DeltaHawk DH180A4 134 kW (180 hp) or DH200A4 149 kW (200 hp) liquid-cooled four-cylinder two-stroke Diesel engine, driving either fixed-pitch or constant-speed propeller. Fuel capacity 120 litres (31.7 US gallons; 26.4 Imp gallons) in single fuselage tank in M212-100 prototype; production examples will have two wing tanks and total capacity of 160 litres (42.3 US gallons; 35.2 Imp gallons), can be increased to 280 litres (74.0 US gallons; 61.6 Imp gallons). In developed form as four-seat tourer, suitable for engines in 172 to 194 kW (230 to 260 hp) power range.

ACCOMMODATION: Four persons in 2+2 configuration, under one-piece, forward-hinged canopy. Seats and rudder pedals adjustable; dual controls standard.

All data are provisional.

DIMENSIONS, EXTERNAL:

Wing span	9.80 m (32 ft 1¾ in)
Wing aspect ratio	8.0
Length overall	7.40 m (24 ft 3½ in)
Height overall	2.90 m (9 ft 6 in)
Tailplane span	3.20 m (10 ft 6 in)
Wheel track	2.80 m (9 ft 2¼ in)

DIMENSIONS, INTERNAL:

Cabin: Length	2.50 m (8 ft 2½ in)
Max width	1.12 m (3 ft 8 in)
Max height	1.25 m (4 ft 1¼ in)
Baggage compartment volume:	
M212-100	0.50 m³ (17.7 cu ft)

AREAS:

Wings, gross	12.00 m² (129.2 sq ft)
Ailerons (total)	0.60 m² (6.46 sq ft)
Flaps (total)	1.08 m² (11.62 sq ft)
Elevators (total)	2.65 m² (28.52 sq ft)

WEIGHTS AND LOADINGS (Superior XP-360):

Weight empty	722 kg (1,592 lb)
Max T-O weight	1,150 kg (2,535 lb)
Max wing loading	95.8 kg/m² (19.63 lb/sq ft)
Max power loading	6.39 kg/kW (10.50 lb/hp)

PERFORMANCE (Superior XP-360):

Never-exceed speed (VNE)	183 kt (338 km/h; 210 mph)
Max level speed at S/L	140 kt (259 km/h; 161 mph)
Max cruising speed at FL80:	
at 75% power	137 kt (254 km/h; 158 mph)
at 60% power	126 kt (233 km/h; 145 mph)
Stalling speed, flaps down	53 kt (99 km/h; 61 mph)
Max rate of climb at S/L	274 m (900 ft)/min
T-O run	280 m (920 ft)
Range with max fuel	
at 75% power	480 n miles (889 km; 552 miles)
at 60% power	550 n miles (1,018 km; 633 miles)

WINNER

WINNER M500
 81 rue Chèvequeue, B-1457 Walhain
 Tel/Fax: (+32 3) 10 65 13 75
 e-mail: winner500@skynet.be
 Web: www.winner500.com
 DIRECTORS: Jean Joordens
 Jean-Yves Dantinne

Winner was formed on 12 July 2004 to manufacture and market the M500 ultralight helicopter, operating from a 250 m² (2,690 sq ft) factory. The workforce numbered three in December 2005.

WINNER M500

TYPE: Single-seat ultralight helicopter.
 PROGRAMME: Resembles Mini 500 scale version of Hughes/MDH 500, but of original engineering. First flight (F-PJOO, registered as Joordens M-5JJ) 2004.
 COSTS: Flyaway, EUR50,000, including tax (2006).
 DESIGN FEATURES: Variable-incidence half-tailplane starboard, opposite tail rotor. Main rotor TBO 1,000 hours.
 STRUCTURE: Welded 4041 steel frame and boom; composites pod; composites and metal main rotor; aluminium tail rotor.
 LANDING GEAR: Skid type; metal tube with leg fairings.
 POWER PLANT: One 74.0 kW (99 hp) Hirth 3701ES water-cooled, three-cylinder two-stroke with electronic injection. Fuel capacity 60 litres (15.85 US gallons; 13.2 Imp gallons).
 DIMENSIONS, EXTERNAL:
 Main rotor diameter 5.79 m (19 ft 0 in)
 Tail rotor diameter 0.95 m (3 ft 1½ in)
 Length: fuselage 5.49 m (18 ft 0¼ in)
 overall, rotors turning 6.89 m (22 ft 7¼ in)
 Height overall 2.47 m (8 ft 1¼ in)



Winner M500 prototype 1037922

WEIGHTS AND LOADINGS:
 Weight empty 264 kg (582 lb)
 Max T-O weight 450 kg (992 lb)
 PERFORMANCE:
 Max operating speed 94 kt (175 km/h; 109 mph)
 Normal cruising speed 76 kt (140 km/h; 87 mph)
 Max rate of climb at S/L 244 m (800 ft)/min
 Max range 189 n miles (350 km; 217 miles)

WOLFSBERG

WOLFSBERG AIRCRAFT CORPORATION NV
 Woudstraat 23, B-3600 Genk
 Tel: (+32 89) 46 76 33
 Fax: (+32 89) 84 42 51
 MANAGING DIRECTOR: Alec N Clark

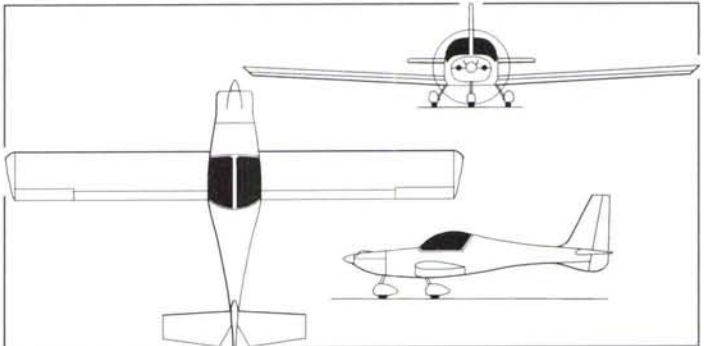
Formerly Triloader Aircraft Corporation NV, formed 1995, which at that time intended to develop the Clark-Norman Triloader. Name changed to Wolfsberg Aircraft Corporation NV and development started of a family of twin-boom aircraft in 1 tonne load category.
 All manufacture by Wolfsberg Letecká Tovarna in Prague, Czech Republic. Prototype Raven 257 flew 28 July 2000; extensively redesigned and relaunched in 2005 as Corvus I, new version first flew 6 June 2006. Belgian company is responsible for direction of its Czech subsidiary and for Corvus marketing and sales throughout the world.

Brazil

AEROALCOOL

AEROALCOOL TECNOLOGIA LTDA
 Aeroporto Municipal de France, Rod Franca-Batatais, SP 336 Km 2, Jardim Aeroporto, CEP 14430-450
 Tel: (+55 16) 37 01 78 94
 Fax: (+55 16) 37 01 75 23
 e-mail: faleconosco@aeroalcool.com.br
 Web: www.aeroalcool.com.br
 PRESIDENT: James R Waterhouse
 CO-FOUNDER: Omar J J Pugliesi

Formed in 2001. Aeroalcool specialises in converting aircraft engines to alcohol power. Its initial aircraft design is the Quasar Lite.



Aeroalcool Quasar Lite alcohol-powered tourer and sportplane (Paul Jackson) 1159256

AEROÁLCOOL QUASAR LITE

TYPE: Side-by-side ultralight.
 PROGRAMME: Prototype PU-ACX registered in January 2003; first flight announced February 2006. US promotion began at AirVenture, Oshkosh, in July 2006. US demonstrator N5QL.
 DESIGN FEATURES: Economic, high speed tourer and sportplane powered by alcohol. Low, constant-chord wings of high aspect ratio with Hoerner tips. Tapered rear fuselage mounting tall, sweptback fin with underfin and trapezoidal tailplanes.
 FLYING CONTROLS: Manual. All-moving tailplane, plus rudder and ailerons. Slotted flaps. Aileron and tailplane actuation by pushrods.
 STRUCTURE: Fuselage of glass fibre and epoxy resin, with PVC foam, plus carbon fibre reinforcement. Aluminium rudder and tailplane structure with polyester fabric covering except for aluminium leading-edge D box. Acrylic canopy with carbon fibre frame. Stainless steel firewall. Wing of riveted 2024T3 aluminium attached to fuselage by titanium reinforcements.



Prototype Aeroalcool Quasar ultralight 1158507

LANDING GEAR: Tricycle type; fixed. Fuselage-mounted spring cantilever SAE 4130 steel mainwheel legs. Cantilever nosewheel leg of 7075 aluminium SAE T7351. Hydraulic mainwheel brakes.
 POWER PLANT: One 41.7 kW (56 hp) Aeroalcool AA-1600 flat-four piston engine driving a two-blade wooden propeller. Integral fuel tanks in wings, combined capacity 80 litres (21.1 US gallons; 17.6 Imp gallons) of alcohol.
 SYSTEMS: Electrical system 12 V with 16 Ah battery.
 EQUIPMENT: Optional ballistic recovery parachute and occupant airbags.
 DIMENSIONS, EXTERNAL:
 Wing span 9.25 m (30 ft 4¼ in)
 Length overall 5.60 m (18 ft 4½ in)
 Height overall 2.18 m (7 ft 1¾ in)
 DIMENSIONS, INTERNAL:
 Cabin max width 1.06 m (3 ft 5¾ in)
 AREAS:
 Wings, gross 9.20 m² (99.0 sq ft)
 WEIGHTS AND LOADINGS:
 Max baggage weight 15 kg (33 lb)
 Max fuel weight 56 kg (124 lb)
 Max T-O weight 480 kg (1,058 lb)
 PERFORMANCE:
 Never-exceed speed (VNE) 146 kt (270 km/h; 168 mph)
 Cruising speed at 75% power 103 kt (191 km/h; 119 mph)
 Stalling speed, flaps down 39 kt (72 km/h; 45 mph)
 Max rate of climb at S/L 168 m (550 ft)/min
 Range with max fuel 834 n miles (1,545 km; 960 miles)
 Endurance 8 h

AEROMOT

AEROMOT INDÚSTRIA MECÂNICO-METALÚRGICA LTDA

Caixa Postale 8031, Avenida das Indústrias 1210, 90200-290 Porto Alegre, RS
Tel: (+55 51) 33 57 85 00
Fax: (+55 51) 33 71 16 55
e-mail: industria@aeromot.com.br
Web (1): www.ximango.com.br
Web (2): www.aeromot.com.br
PRESIDENT: Cláudio B Viana
MANAGING DIRECTOR: João Cláudio Jotz
MARKETING CONTACT: Fabiane Dorneles

Aeromot Indústria is part of Aeromot Group with Aeromot Aeronaves e Motores SA (parent company, founded 1967, which provides maintenance).

Aeromot Indústria initially designed, certified and built seats for aircraft built by Embraer; it later produced several structural parts for Embraer aircraft, and designed and certified seats for Airbus, Boeing, Fokker and McDonnell Douglas (now Boeing) commercial transports. In 1985 it purchased assets of Fournier motor glider factory in France, including sole manufacturing rights for RF-10; has since incorporated several improvements to basic model, including different engines and propellers. A lightplane version, the AMT-600 Guri, with reduced wing span, first flew in 1999 and was certified in December 2001.

Factory has shop floor area of 3,100 m² (33,375 sq ft) and workforce of approximately 150. In late 2003, Aeromot was reported to be in the final stages of negotiation with GAIC of China with regard to the latter's licensed production of the Guri and, subject to a change of Chinese air licencing law, the Super Ximango. Joint development and production of a four-seat aircraft is also under consideration.

AEROMOT XIMANGO

US Air Force designation: TG-14

TYPE: Motor glider.

PROGRAMME: Brazilian production version of French Aérostructure (Fournier) RF-10; first flight (French prototype) 6 March 1981; see Sailplanes section of 1990-91 *Jane's* for French production history. All production rights sold to Aeromot July 1985: Brazilian CTA certification of AMT-100 granted 5 June 1986 and French (DGAC) 10 October 1990; AMT-200, developed by Aeromot, made first flight July 1992; was certified 3 February 1993 in Brazil, on 29 December 1993 in USA (to FAR Pt 22), during 1995 in UK and on 24 November 1998 in Canada. Certification of AMT-200 also achieved in Australia, Colombia, France, Germany, Japan, Netherlands and New Zealand.

CURRENT VERSIONS: **AMT-100 Ximango:** Initial production version; powered by one 59.7 kW (80 hp) Limbach L 2000 EO1 flat-four engine driving a Hoffmann HO-V62RL/160BT two-blade three-position variable-pitch propeller. Total 43 built, 1988-93.

AMT-100P Ximango: Military/police and observation version. Two side windows below canopy; underfuselage pod for 100 kg (220 lb) of weapons and avionics or surveillance equipment. In service with Brazilian military police and other law enforcement and environment protection agencies. Production ceased; replaced by AMT-200P, AMT-200SP and AMT-300P with similar optional equipment.

AMT-200 Super Ximango: Generally similar to AMT-100 except for Rotax 912A power plant. Main production variant between 1995 and 2000. Improvements introduced in 1997 include redesigned instrument panel; new canopy locking mechanism; fully enclosing main landing gear doors; tailwheel fairing; and metal fuel tanks.

AMT-200P: Military, police and observation version.

AMT-200S Super Ximango S: Version optimised for pilot training and soaring (S indicating 'sport'). Generally similar to AMT-200 except for Rotax 912 S4 engine and optional removable winglets (span as AMT-300). Prototype first flew in September 1999; deliveries from December 1999, to customers in Australia (one), Brazil (one), Dominican Republic (one), South Africa (two), UK (two) and USA (22). Main production variant from 2000.

Selected from at least 13 types evaluated for the USAF's Introductory Flight Training Program (IFTTP), replacing grounded Slingsby T-3A Fireflies in flight screening/primary training role; initial order for 14 aircraft announced October 2001; first (01-0136/N136XS) delivered to 94th Flight Training Squadron of US Air Force Academy at Colorado Springs on 24 June 2002, all operating with civilian registrations.

AMT-200SP: Military, police and observation version.

Detailed description applies to the AMT-200 except where indicated.

AMT-300 Turbo Ximango Shark: Prototype (PT-ZAM, converted from an early AMT-100) flew July 1997; based on AMT-200, but with Rotax 914F turbocharged engine, redesigned cockpit, new engine cowling and winglets. Brazilian certification achieved 31 March 1999, followed by FAA approval 19 July 1999; deliveries began in May 1999 with two aircraft for US market to Ximango US at Spruce Creek, Florida; believed none further by late 2005, however.

AMT-300P: Military, police and observation version.

AMT-300R Reboque: Glider tug version of AMT-300.

AMT-600 Guri: Trainer and sport aerobatic version. Described separately.

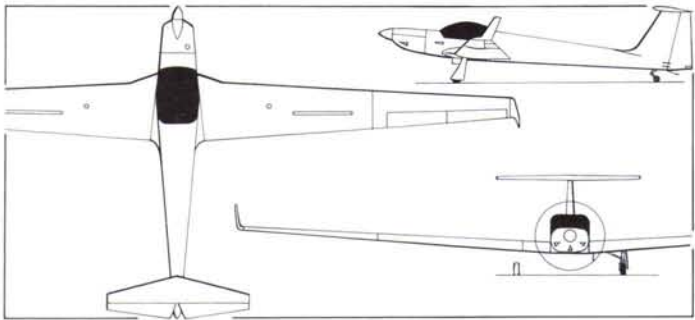
CUSTOMERS: Initial order for 50 from Brazilian Civil Aeronautical Department; also produced for military/paramilitary roles such as observation, patrol and counter-insurgency. Total of 163 AMT-100s, AMT-200s, AMT-200Ss and AMT-300s produced by December 2004, including deliveries to customers in Argentina (two), Australia (seven), Belgium (one), Brazil (63), Canada (one), Colombia (one), Dominican Republic (one), France (seven), Germany (two), Japan (four), South Africa (two), Mexico, UK (six), USA (49) and undisclosed (5). Further airframe (c/n 112) completed as prototype Guri. AMT-300 production began at No. 106, but continues in parallel with AMT-200.

COSTS: USD135,000 basic for AMT-200; USD143,000 basic for AMT-200S; USD154,000 basic for AMT-300 (all 2004).



Aeromot AMT-200S Super Ximango S (Paul Jackson)

1151727



Aeromot AMT-200 Super Ximango S (James Goulding)

0589198

DESIGN FEATURES: Typical motor glider; low, tapered wing with fixed incidence T tail. Wings detachable for transportation and storage; outboard half of wing can be folded inward without disconnecting aileron controls.

Wing section NACA 64₁-618; dihedral 2° 30'.

FLYING CONTROLS: Conventional and manual; ailerons and elevators operated by pushrods, rudder by cables; trim tab actuated by cable on AMT-100/200; trim control on AMT-200S/300 effected by spring device on elevator pushrod. Schempp-Hirth airbrakes in wing upper surface.

STRUCTURE: All-GFRP/foam except for carbon fibre main spar and light alloy airbrakes.

LANDING GEAR: Mechanically retractable mainwheels (tyre size 330x130), with hydraulic suspension and Cleveland hydraulic disc brakes with differential action; steerable tailwheel with size 210x65 tyre.

POWER PLANT: One 59.6 kW (79.9 hp) Rotax 912A flat-four with Hoffmann HO-V62R/170FA propeller. Fuel in two main tanks in wings, combined capacity 90 litres (23.8 US gallons; 19.75 Imp gallons). AMT-200S has one 73.5 kW (98.6 hp) Rotax 914 S4, driving a three-position variable-pitch Hoffmann propeller. AMT-300 has one 84.6 kW (113.4 hp) Rotax 914 F3 turbocharged flat-four driving an MT/MTV-21 constant-speed feathering propeller; fuel capacity 90 litres (23.8 US gallons; 19.8 Imp gallons).

ACCOMMODATION: Two seats side by side. One-piece canopy hinged at rear to open upward. Dual controls standard.

SYSTEMS: Electric starter and 12 V 30 A alternator.

DIMENSIONS, EXTERNAL:

Wing span: 200, 200S	17.47 m (57 ft 3 3/4 in)
300	17.67 m (57 ft 11 1/2 in)
Wing aspect ratio: 200, 200S	16.3
300	16.7
Width, wings folded	10.15 m (33 ft 3 1/2 in)
Length overall	8.08 m (26 ft 6 in)
Height overall: 200, 200S, 300	1.93 m (6 ft 4 in)
Tailplane span	3.68 m (12 ft 0 3/4 in)
Wheel track	2.80 m (9 ft 2 1/4 in)
Wheelbase	5.03 m (16 ft 6 in)
Propeller diameter: 200, 200S	1.70 m (5 ft 7 in)
300	1.65 m (5 ft 5 in)

DIMENSIONS, INTERNAL:

Cockpit: Length	1.85 m (6 ft 0 3/4 in)
Max width	1.15 m (3 ft 9 1/4 in)
Max height	1.00 m (3 ft 3 1/4 in)

AREAS:

Wings, gross: 200, 200S	18.70 m ² (201.3 sq ft)
300	18.75 m ² (201.8 sq ft)
Ailerons (total)	2.72 m ² (29.28 sq ft)
Airbrakes (total)	1.16 m ² (12.49 sq ft)
Fin	1.44 m ² (15.50 sq ft)
Rudder	0.69 m ² (7.43 sq ft)
Tailplane	1.95 m ² (20.99 sq ft)
Elevator	0.95 m ² (10.23 sq ft)

WEIGHTS AND LOADINGS:

Weight empty: 200	620 kg (1,367 lb)
200S	625 kg (1,378 lb)
300	630 kg (1,389 lb)
300R	620 kg (1,367 lb)
Max T-O weight: 200, 200S, 300	850 kg (1,874 lb)
Max baggage: 300	10 kg (22 lb)
Max wing loading: 200, 200S	45.5 kg/m ² (9.31 lb/sq ft)
300	45.3 kg/m ² (9.28 lb/sq ft)
Max power loading: 200	14.26 kg/kW (23.42 lb/hp)
200S	11.56 kg/kW (19.00 lb/hp)
300	9.92 kg/kW (16.29 lb/hp)

PERFORMANCE, POWERED:

Never-exceed speed (VNE):	133 kt (245 km/h; 153 mph)
200, 200S, 300	110 kt (205 km/h; 127 mph)
Max cruising speed: 200	119 kt (220 km/h; 137 mph)
200S	124 kt (230 km/h; 143 mph)
300	122 kt (225 km/h; 140 mph)
Normal cruising speed: 300	42 kt (78 km/h; 48 mph)
Stalling speed: 300	156 m (512 ft)/min
Max rate of climb at S/L: 200	180 m (591 ft)/min
200S	198 m (650 ft)/min
300	more than 4,900 m (16,076 ft)
Service ceiling: 200, 200S	more than 8,700 m (28,543 ft)
300	226 m (745 ft)
T-O run, hard runway: 200	210 m (689 ft)
200S	174 m (570 ft)
300	305 m (1,001 ft)
T-O to 15 m (50 ft), hard runway:	296 m (970 ft)
200	less than 300 m (984 ft)
300	less than 150 m (492 ft)
Landing from 15 m (50 ft)	
Landing run	
Range with max fuel:	
200: best power	594 n miles (1,100 km; 683 miles)
best economy	756 n miles (1,400 km; 870 miles)

200S: best power	575 n miles (1,065 km; 661 miles)
best economy	783 n miles (1,450 km; 901 miles)
300: best power	548 n miles (1,015 km; 630 miles)
best economy	810 n miles (1,500 km; 932 miles)
Max endurance:	
200: best power	5 h 30 min
best economy	12 h
200S: best power	4 h 54 min
best economy	12 h
300: best power	4 h 30 min
best economy	12 h
g limits: 200, 200S, 300	+5.3/-2.65
PERFORMANCE, UNPOWERED:	
Best glide ratio at 58 kt (108 km/h; 67 mph):	
200, 200S	31.1
300	32.1
Min rate of sink at 52 kt (97 km/h; 60 mph):	
200, 200S	0.93 m (3.05 ft)/s
300	0.96 m (3.15 ft)/s
Stalling speed: 200, 200S, 300	42 kt (78 km/h; 48 mph)

AEROMOT AMT-600 GURI

English name: Little Boy

TYPE: Aerobatic two-seat lightplane.

PROGRAMME: Design began July 1998; prototype (PP-XBS), employing a Ximango airframe first flown 13 July 1999; Brazilian CTA certification was achieved 12 December 2001. First production aircraft (PR-AMT) registered in August 2003 and second (PR-LCB) in January 2004.

Negotiations under way in late 2004 for a retractable landing gear version to be built under licence by GIAC in China.

CURRENT VERSIONS: **AMT-600 Guri:** Initial production version, as described.

Data below are provisional, and refer to prototype.

Advanced Trainer: Projected derivative with 134 kW (180 hp) Textron Lycoming engine, retractable landing gear and IFR avionics.

CUSTOMERS: Brazilian DAC (civil aeronautics department) signed order for 25 on 21 September 2004, to be distributed to several aero clubs. First (PR-LCB) delivered to Aero Club do Rio Grande do Sul on 11 November 2003; two to club at Amarais, Campinas, 1 December 2005. Hand-over of 13th and 14th production aircraft, to Pará Aero Club, took place on 27 October 2006.

COSTS: BRL400,000 (2005).

DESIGN FEATURES: Generally as Ximango, but shortened wings (of same aerofoil section) and tricycle fixed landing gear. Wings can be removed for storage.

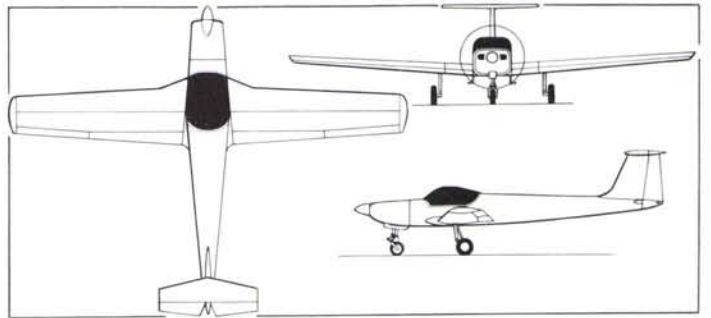
FLYING CONTROLS: Conventional and manual; ailerons and elevator operated by pushrods, rudder by cables; ground-adjustable trim tab on rudder and starboard aileron. Control surface maximum deflections: elevator +22/-25°, ailerons +27/-15°, rudder right, 28°, left 22°, flaps 15 and 30°.

STRUCTURE: Generally as for Ximango. Wing includes I-beam main spar, plus rear spar of Z shape to accommodate ailerons and flaps; two ribs in each panel, at centre-section break and tip, but three ribs per side at centre-section to strengthen walkways. Ailerons and flaps have leading- and trailing-edge spars, each with six glass fibre ribs stiffened with foam and aluminium skirt. Two fuselage bulkheads only: one horizontal, one vertical, for attachment of tail surfaces. Plywood for local strengthening in areas of equipment installations.



Aeromot AMT-600 Guri of Pará Aero Club (ANAC)

1040564



Aeromot AMT-600 Guri (James Goulding)

1042471

LANDING GEAR: Non-retractable tricycle type, with hydropneumatic trailing-link suspension on main units and rubber-in-compression suspension on nose leg. Oldi wheels and brakes. Mainwheel tyre size 6.00x6, nosewheel 5.00x5.

POWER PLANT: One 86.5 kW (116 hp) Textron Lycoming O-235-NBR (Aeromot-assembled O-235-NC2) flat-four, driving a two-blade Sensenich 72CK-0-50 aluminium propeller. Fuel contained in two wing tanks, combined capacity 90 litres (23.8 US gallons; 19.8 Imp gallons), of which 88 litres (23.2 US gallons; 19.3 Imp gallons) usable, with filler port in upper surface of each wing. Oil capacity 5.7 litres (1.5 US gallons; 1.25 Imp gallons).

ACCOMMODATION: Two persons, side by side, under single-piece, upward- and rearward-levered canopy. Dual controls standard. Boarding step on each side forward of wing on prototype will be relocated aft of wing on production aircraft.

AVIONICS: VFR avionics, including Garmin GPS 100; IFR avionics optional.

Instrumentation: ASI altimeter, VSI, turn/slip indicator, magnetic compass, tachometer, oil temperature gauge, oil pressure gauge, fuel pressure gauge, fuel quantity gauge and ammeter, all standard.

EQUIPMENT: Fire extinguisher standard.

DIMENSIONS, EXTERNAL:

Wing span	10.50 m (34 ft 5½ in)
Wing aspect ratio	8.0
Aileron span	2.00 m (6 ft 6¾ in)
Flap span	2.50 m (8 ft 2½ in)
Length overall	8.07 m (26 ft 5¾ in)
Height overall	2.65 m (8 ft 8¼ in)
Tailplane span	2.60 m (8 ft 6¼ in)
Wheel track	2.99 m (9 ft 9¾ in)
Wheelbase	1.75 m (5 ft 9 in)
Propeller diameter	1.83 m (6 ft 0 in)

DIMENSIONS, INTERNAL:

Cabin max width	0.86 m (2 ft 10 in)
-----------------	---------------------

AREAS:

Wings, gross	13.79 m² (148.4 sq ft)
Ailerons (total)	0.90 m² (9.69 sq ft)
Flaps (total)	1.40 m² (15.07 sq ft)
Rudder	0.63 m² (6.78 sq ft)
Tailplane	1.41 m² (15.18 sq ft)
Elevator	0.76 m² (8.18 sq ft)

WEIGHTS AND LOADINGS:

Weight empty	675 kg (1,488 lb)
Max T-O weight	900 kg (1,984 lb)
Max baggage weight	10 kg (22 lb)
Max wing loading	65.3 kg/m² (13.37 lb/sq ft)
Max power loading	10.49 kg/kW (17.23 lb/hp)

PERFORMANCE:

Never-exceed speed (VNE)	122 kt (226 km/h; 140 mph)
Cruising speed	85 kt (157 km/h; 97 mph)
Stalling speed	49 kt (90 km/h; 56 mph)
Max rate of climb at S/L	216 m (709 ft)/min
Service ceiling	5,300 m (17,380 ft)
T-O run	130 m (427 ft)
Max range	783 n miles (1,450 km; 901 miles)
Endurance	6 h 0 min
g limits	+3.8/-1.52

AIRMAX

AIRMAX CONSTRUÇOES AERONAUTICS LTDA

Estrada do Rio Grande 1588, Jacarépagua RJ, CEP 22720-011

Tel: (+55 21) 24 40 95 31

e-mail: falecom@airmax.com.br

Web: www.airmax.com.br

TECHNICAL DIRECTOR: Miguel Rosário

Designed by Sen Rosário, who has previously specialised in ultralight landplanes, the SeaMax amphibian is now being marketed in Europe by Pelicano of Portugal (www.pelicano.com.pt) and other dealers, including one in Norway.

AIRMAX M22 SEAMAX

TYPE: Two-seat amphibian kitbuilt.

PROGRAMME: Developed and flown in Brazil; prototype XM22 (PU-ASN) built 2002; European demonstrator registered (CS-UMZ) March 2004.

CUSTOMERS: Total 28 aircraft registered by mid-2006 to customers in Brazil, Portugal and Sweden.

DESIGN FEATURES: Single-step flying-boat hull with longitudinal strake inboard of chine, each side. Pusher propeller. High wing, braced by single, streamlined strut each side, with tapered outer panels. Stabilising float mounted on cantilever strut immediately inboard of wingtip. Cruciform empennage with sweptback fin. Tailplane fences, upper and lower, on early aircraft. Vortex generators fore and aft of mainwheel bays.

FLYING CONTROLS: Manual. Mass-balanced Frise ailerons and rudder; all-moving tailplane with two anti-balance tabs occupying full trailing-edge. Slotted flaps. Water rudder, stowed horizontally in base of rudder, rotates 90° when activated.



AirMax SeaMax two-seat amphibian (Paul Jackson)

1037943

STRUCTURE: Composites fuselage (glass fibre, carbon fibre/Kevlar) with aluminium and glass fibre wing (including Kevlar-reinforced fuel tanks) covered in polyester/Butyrate. Lighter, all-composites wing in process of design. Engine mounted on metal cabane with composites cowl.

LANDING GEAR: Tricycle type; retractable. Electromechanical actuation. Mainwheels 12x5.00-5, with hydraulic brakes. Stainless steel mainwheel legs, with oleo shock-absorbers, retract upwards and inwards. Freely-castering nosewheel, size 11x3.50-4, with oleo shock-absorber, retracts forward.

POWER PLANT: One 73.5 kW (98.6 hp) Rotax 912 ULS flat-four driving a Warp Drive three-blade, ground-adjustable pitch, pusher propeller. Optional variable-pitch, reversible propeller. Optional 59.6 kW (79.9 hp) Rotax 912 UL. Fuel in two wing tanks and central collector tank, total capacity 96 litres (25.4 US gallons; 21.1 Imp gallons).

ACCOMMODATION: Two persons, side by side. Lead ballast required for single-pilot operation.

DIMENSIONS, EXTERNAL:

Wing span	8.75 m (28 ft 8½ in)
Wing aspect ratio	6.3
Length overall	5.68 m (18 ft 7½ in)

DIMENSIONS, INTERNAL:

Cabin max width	1.19 m (3 ft 10¾ in)
-----------------	----------------------

AREAS:

Wings, gross	12.24 m² (131.8 sq ft)
--------------	------------------------

WEIGHTS AND LOADINGS:

Weight empty	300 kg (661 lb)
Max T-O weight	520 kg (1,146 lb)

PERFORMANCE:

Never-exceed speed (VNE)	139 kt (257 km/h; 160 mph)
Max level speed	113 kt (209 km/h; 130 mph)
Normal cruising speed	104 kt (193 km/h; 120 mph)
Stalling speed, flaps down	32 kt (58 km/h; 36 mph)
Max rate of climb at S/L	305 m (1,000 ft)/min
T-O run: land	85 m (280 ft)
water	100 m (330 ft)
Landing run: land	80 m (265 ft)
water	100 m (330 ft)
Endurance	5 h 15 min
g limits	+5/-3

EDRA AERONÁUTICA

EDRA AERONÁUTICA, PEÇAS E MANUTENÇÃO LTDA

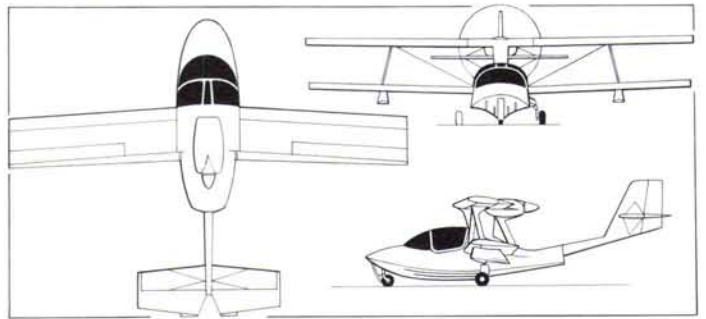
Rodovia Estadual SP-191 Km 87.5, 13537-000 Ipeúna, São Paulo
Tel: (+55 19) 35 76 12 92
Fax: (+55 19) 35 76 13 92
e-mail: mnd@edraaeronautica.com.br
Web: www.edraaeronautica.com.br

WORLD DISTRIBUTOR:
Amphibian Airplanes of Canada Ltd
Box 1100, Squamish, British Columbia, V0N 3G0, Canada
Tel: (+1 604) 898 53 27 and 32 00
Fax: (+1 604) 898 20 09 and (+1 775) 890 08 83
e-mail: harusch@uniserve.com
Web: www.seastaramphibian.com

Following cessation of manufacture by the Billie company in France, the Pétrél amphibian is being produced in Brazil for local and export markets. Marketing outside South America is undertaken by Amphibian Airplanes of Canada, which built the first North American SeaStar in 1998. Components are imported and augmented by North American standard items before sale as kits. Exports have been made as far afield as Australia, Portugal and Norway.

The Pétrél production line and design rights were sold in 2001 to Prolazer Ultrales which, in a joint venture with EDRA, implemented a programme of aerodynamic, structural and powerplant improvements resulting in the Super Pétrél.

EDRA Aeronáutica, formed in 1986, is one of three components of the EDRA group, founded in 1974 as EDRA do Brasil and with interests in pilot training, aircraft maintenance, air taxi services and aircraft dealership (Schweizer helicopters, Pulsar and Comco Ikarus kits for Brazil). The group had 600 employees at the end of 2005, of whom 40 were employed by EDRA Aeronáutica.



Páturi amphibious two-seat lightplane (James Goulding) 0100404

COSTS: Super Pétrél kit USD26,980; SeaStar SP kit USD29,975, or flyaway USD58,000 (2006).

DESIGN FEATURES: Experimental category pusher-engined biplane; road-towable on custom-designed trailer with assembly/disassembly time of 30 minutes. Quoted kit build time 500 hours (fast-build kit).

Equal-span, constant-chord wings, upper unit mounted on cabane; V-type interplane struts, with diagonal strut brace to fuselage from upper plane. Single-step hull. Boom-mounted empennage, wire-braced. Floats at mid-span of lower plane. Shorter lower span with floats at tips.

Wing section NACA 2412: dihedral 2° 13' on upper wings, 3° 26' on lower; sweepback 4° upper, 2° lower.

FLYING CONTROLS: Conventional and manual. Ailerons on upper wing only. No flaps. Actuation by wires (rudder) and pushrods. Electric trim.

STRUCTURE: Moulded monocoque single-step hull of epoxy/carbon fibre foam with carbon fibre tailboom; wings have 2014-T6 aluminium alloy tubular main spar with PVC foam ribs and glass fibre/epoxy leading-edge and tips covered with fabric and braced by single diagonal strut and V interplane struts of 6061-T6 aluminium. Wings disassemble for ground transportation. Tail surfaces of glass fibre spars and PVC foam ribs, with fabric and glass fibre covering, stainless steel wire braced.

LANDING GEAR: Retractable tricycle type; based on Mooney design, with Johnson bar actuation; main units retract upwards into hull and undersurface of lower wing; nosewheel retracts upwards and forwards, tyre remaining partially exposed to serve as docking bumper when operating on water. Nosewheel maximum steering angle 80°. Hydraulic disc brakes on main units. No water rudders.

POWER PLANT: Páturi: One 73.5 kW (98.6 hp) Rotax 912 ULS four-stroke piston engine driving an Airplast 175 three-blade pusher propeller. Optional Airplast PV 50 in-flight adjustable pitch propeller with electric or manual control. Fuel capacity 100 litres (26.4 US gallons; 22.0 Imp gallons).

Super Pétrél: Choice of one 47.8 kW (64.1 hp) Rotax 582 or 73.5 kW (98.6 hp) Rotax 912 ULS driving Airplast 175 three-blade pusher propeller. Fuel capacity 90 litres (23.8 US gallons; 19.8 Imp gallons).

ACCOMMODATION: Two, side by side in open or enclosed cockpit, with windscreen or single-piece forward-hinged canopy. Dual controls.

EQUIPMENT: Optional BRS ballistic parachute. Bilge pump.

EDRA AERONÁUTICA PÁTURI

English name: Masked Duck
Export marketing name: SeaStar
Canadian name: Sao Paolo Seabird
TYPE: Two-seat amphibian/kitbuilt.
PROGRAMME: Derived from Claude Tisserand's Hydroplum II, prototype of which first flew 1 November 1986; SMAN bought design rights in 1987; construction of Pétrél prototype began January 1989; first flight July 1989. Around 100 built in France; rights passed to Billie Aero Marine. Pétrél production transferred to Brazil by 1997, where renamed Páturi; manufacturing and design rights sold to Prolazer Ultrales in 2001.

CURRENT VERSIONS: Páturi: Initial version, produced from 1997 onwards. Data refer to this version unless otherwise stated.

Super Pétrél: Introduced in 2002 as joint venture between EDRA Aeronáutica and Prolazer Ultrales; redesigned version of Páturi, with lowered engine position, revised wheels and brakes and improved control surfaces.

SeaStar SP: North American version marketed by Amphibian Airplanes of Canada.

CUSTOMERS: Total of more than 190 produced by EDRA by late 2005; in addition, over 100 kits sold by December 2003. Customers in Europe, Africa, Canada, Australia, New Zealand, USA and Brazil.



EDRA Aeronautica Super Pétrél 1158438

DIMENSIONS, EXTERNAL:

Wing span (both): Páturi	8.25 m (27 ft 8 in)
Super Pétrél	8.90 m (29 ft 2½ in)
Length overall: Páturi	6.47 m (21 ft 2¾ in)
Super Pétrél	5.97 m (19 ft 7 in)
Height overall: both	2.26 m (7 ft 5 in)
Wheel track: Páturi	1.78 m (5 ft 10 in)
Wheelbase: Páturi	2.10 m (6 ft 10¾ in)
Propeller diameter: both	1.65 m (5 ft 5 in)

DIMENSIONS, INTERNAL:

Cabin max width: both	1.13 m (3 ft 8½ in)
-----------------------	---------------------

AREAS:

Wings, gross: Páturi	16.50 m² (177.6 sq ft)
Super Pétrél	15.00 m² (161.46 sq ft)

WEIGHTS AND LOADINGS (Rotax 912 engine):

Weight empty: Páturi	350 kg (772 lb)
Super Pétrél	315 kg (694 lb)
Max T-O weight: Páturi	650 kg (1,433 lb)
Super Pétrél, Rotax 912	545 kg (1,201 lb)
Max wing loading: Páturi	39.4 kg/m² (8.07 lb/sq ft)
Super Pétrél	36.33 kg/m² (7.44 lb/sq ft)
Max power loading: Páturi	8.84 kg/kW (14.53 lb/hp)
Super Pétrél	7.41 kg/kW (12.18 lb/hp)

PERFORMANCE (both with Rotax 912 ULS):

Never-exceed speed (VNE): both	98 kt (180 km/h; 112 mph)
Max level speed: both	92 kt (170 km/h; 106 mph)
Max cruising speed: Páturi	86 kt (160 km/h; 99 mph)
Super Pétrél	84 kt (155 km/h; 96 mph)
Manoeuvring speed: Páturi	81 kt (150 km/h; 92 mph)
Stalling speed: Páturi	35 kt (65 km/h; 41 mph)
Super Pétrél	31 kt (56 km/h; 35 mph)

Max rate of climb at S/L: Páturi	152 m (500 ft)/min
Super Pétrel	305 m (1,000 ft)/min
Service ceiling: Páturi	3,660 m (12,000 ft)
Super Pétrel	3,048 m (10,000 ft)
T-O run: on land: Páturi	200 m (660 ft)
Super Pétrel	80 m (265 ft)
on water: Páturi	250 m (820 ft)
Super Pétrel	120 m (395 ft)

Landing run: on land: Páturi	250 m (820 ft)
Super Pétrel	120 m (395 ft)
on water: Páturi	150 m (495 ft)
Super Pétrel	100 m (330 ft)
Range with max fuel: Páturi	513 n miles (950 km; 590 miles)
Radius of action, auxiliary fuel	405 n miles (750 km; 466 miles)
Endurance: both	5 h 30 min
g limits: both	+4/-2

EMBRAER

EMPRESA BRASILEIRA DE AERONÁUTICA SA

Av Brig Faria Lima 2170, Caixa Postal 343, 12227-901 São José dos Campos, SP

Tel: (+55 12) 39 27 10 00

Fax: (+55 12) 39 21 23 94

Web: www.embraer.com

CHAIRMAN: Maurício Novis Botelho

PRESIDENT AND CEO: Frederico Fleury Curado

EXECUTIVE VICE-PRESIDENT, INDUSTRIAL: Satoshi Yokota

EXECUTIVE VICE-PRESIDENT, COMMERCIAL: Frederico Pinheiro Fleury Curado

EXECUTIVE VICE-PRESIDENT, PLANNING AND ORGANISATIONAL DEVELOPMENT:

Horácio Aragonés Forjaz

EXECUTIVE VICE-PRESIDENT, FINANCE: Antonio Luis Pizarro Manso

EXECUTIVE VICE-PRESIDENT: Luiz Carlos Aguiar

VICE PRESIDENT, COMMERCIAL (MILITARY MARKETING):

Romualdo Monteiro de Barros

VICE-PRESIDENT, CORPORATE JETS: Sam Hill

VICE-PRESIDENT, AIRLINE MARKETING AND SALES, LATIN AMERICA:

Orlando José Ferreira Neto

PRESS OFFICER: Marcia Benevides

EUROPEAN OFFICE:

Embraer Europe Corporate Jets

Aéroport du Bourget, Zone d'Aviation d'Affaires, BP 74,

F-93352 Le Bourget Cedex, France

Tel: (+33 1) 49 38 44 44

Fax: (+33 1) 49 38 44 45

e-mail: corporatejets@embraer.com

MANAGER: Neil Patton

Created 19 August 1969, Embraer began operating on 2 January 1970. Its 250,000 m² (2,691,000 sq ft) factory at Faria Lima was officially joined on 15 January 2001 by the Eugênio de Mello plant, comprising 147,650 m² (1,589,300 sq ft) of covered space. Both facilities are near São José dos Campos. Fifth company plant, at Gavião Peixoto (300 km; 186 miles northwest of São Paulo) opened 11 June 2002; to expand over five years to 3,000,000 m² (32 million sq ft) and undertake final assembly of Legacy, Super Tucano, AMX-T and special missions versions of EMB-145.

Neiva (which see) became a subsidiary in March 1980. Embraer and subsidiaries have delivered nearly 5,500 aircraft.

Privatisation of Embraer was undertaken on 7 December 1994 with the auction of 55.4 per cent of voting stock. A consortium, led by Bozano Simonsen bank, acquired 45.44 per cent of auctioned stock, assumed a controlling interest in the company, and provided an extra USD36 million in capitalisation. A further 10 per cent of voting stock was offered to the public within 60 days, with Embraer employees and the Brazilian government retaining 10 and 18.4 per cent respectively. In October 1999 a consortium of French aerospace companies, comprising Aerospatiale Matra (now EADS France), Dassault, SNECMA and Thomson-CSF (now Thales), acquired 20 per cent of Embraer's voting shares. Embraer also embarked on a joint venture with Liebherr International of Germany to establish Embraer-Liebherr Equipamentos do Brasil SA (ELEB) to create additional opportunities for the company's landing gear and hydraulics components business. Embraer's controlling group — with 60 per cent of voting shares — comprises pension funds Previ and Sistel, plus investment house Companhia Bozano Simonsen.

Principal current own-design manufacturing programmes are ERJ-135/ERJ-140/ERJ-145 and ERJ-170/175/190/195 regional jet families, EMB-EMB-314 Super Tucano turboprop military trainer and Phenom 100 and Phenom 300 business jets. Subsidiary Neiva manufactures EMB-202 Ipanema agricultural aircraft and holds licences from New Piper in USA. Main production of International (with Italy) AMX attack fighter is complete, but Embraer holds outstanding contract for Venezuelan order.

In subcontract field, first deliveries made in 1994 of wingtips and vertical fin fairings for Boeing 777 under 1991 contract.

Embraer is a risk-sharing partner in the Sikorsky S-92 Helibus programme; under a June 1995 contract valued at US\$170 million, it will supply 730 sets of S-92 fuel sponsons. In 1995 Embraer signed a co-operation agreement with PZL Warszawa-Okecie of Poland under which Embraer subsidiary Neiva SA would market PZL light aircraft in Brazil and PZL subsidiary Skypol would acquire Brasilia for its freight and charter services. This appears to have lapsed.

On 3 April 2002 Embraer, Dassault Aviation, SNECMA Moteurs and Thales Airborne Systems formed the Mirage 2000BR Consortium to develop a version of the Dassault Mirage 2000-5 Mk 2 as a contender for the Brazilian Air Force's F-X BR programme. If selected, FAB Mirage 2000BRs would be assembled at a new Embraer facility at Gavião Peixoto.

On 2 December 2002 Embraer signed an agreement with Harbin Aircraft Industry (Group) Co Ltd and Hafei Aviation Industry Co Ltd to form a new joint venture company, Harbin Embraer Aircraft Company Ltd, which will produce under licence the ERJ-135, ERJ-140 and ERJ-145, primarily for customers in the People's Republic of China. Launch customer China Southern Airlines ordered six ERJ-145s on 2 February 2004. A 24,000 m² (258,330 sq ft) facility has been established in Harbin, Heilongjiang Province, employing up to 220 staff. The first Harbin Embraer-built aircraft, an ERJ-145, was rolled out and made its first flight on 16 December 2003.

Embraer delivered 101 aircraft in 2003, comprising 14 ERJ-135s, 16 ERJ-140s, 57 ERJ-145s, 13 Legacy, and one EMB-145. Totals for 2004 were one ERJ-135, 87 ERJ-145s, 46 Embraer 170s, 13 Legacy and one EMB-145, or 148 in all. Totals for 2005 were two ERJ-135s, 46 ERJ-145s, 46 Embraer 170s, 14 Embraer 175s, 12 Embraer 190s, 20 Legacy and one EMB-145, or 141 in all. Total of 130 aircraft delivered in 2006, comprising 12 ERJ-145s, 36 Embraer 170s, 11 Embraer 175s, 41 Embraer 190s, three Embraer 195, 26 Legacy 600s, and one Legacy Shuttle. Planned target for 2007 is 165 to 170. Firm order backlog valued at USD14.8 billion at 31 December 2006 for airline, corporate, defence and government markets.

EMBRAER EMB-314 SUPER TUCANO

English name: Super Toucan

Brazilian Air Force designations: A-29A and AT-29B

TYPE: Basic turboprop trainer/attack lightplane.

PROGRAMME:

DEVELOPMENT MILESTONES

Development (as EMB-312H)	Jan 91
Announced	Jun 91
First flight	15 May 93
Certification	Aug 94
Selected by Brazilian Air Force	8 Aug 2001
Production started	Feb 2002
First delivery	18 Dec 2003

Design of original EMB-312 Tucano started January 1978. Ministry of Aeronautics contract received 6 December that year for two flying prototypes and two static/fatigue test airframes: first prototype (Brazilian Air Force serial number 1300) made first flight 16 August 1980, second (1301) on 10 December 1980; third to fly (PP-ZDK, on 16 August 1982) was to production standard. Total of 650 built by 1998; further details in 2000-01 and previous *Jane's* and in *Jane's Aircraft Upgrades*.

Development of EMB-314 began January 1991; announced (as EMB-312H) at Paris Air Show June 1991; Embraer development aircraft PT-ZTW (c/n 312161, previously used as prototype for TPE331-powered Tucano adopted by Royal Air Force) modified as Tucano H proof-of-concept (POC) prototype, making first flight in this form 9 September 1991. This aircraft toured US Air Force/Navy bases August and September 1992 as preliminary to Super Tucano entry in JPATS competition; Embraer teamed with Northrop May 1992 to bid Super Tucano for JPATS, but was unsuccessful. Provisional Brazilian type certification granted August 1994 after 500 hour, 396 sortie test and certification programme.

CURRENT VERSIONS: **EMB-314**: Two EMB-312H prototypes (PT[later PP]-ZTV, c/n 312454, first flight 15 May 1993, and PP-ZTF, c/n 312455, first flight 14 October 1993) tailored to US JPATS requirements as EMB-312HJ. Designation subsequently changed to EMB-314 to reflect extensive modifications to structure and systems.

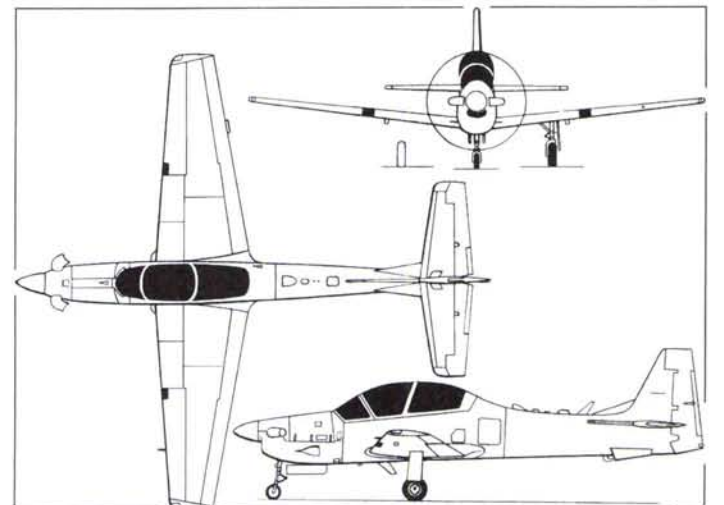
ALX (EMB-314M): Brazilian Air Force (FAB) version, for border patrol missions under its SIVAM (*Sistema de Vigilância da Amazônia*) programme. FAB finalised specification in early 1994; trials to validate projected flight characteristics, using POC aircraft and both Super Tucano prototypes, completed 1994. US\$50 million development contract signed 18 August 1995 for two prototypes (one single-seat) to be modified from Super Tucano prototypes. The first flew in May 1996 and is being used for external stores compatibility and handling qualities testing; the second, which flew in early 1997, for testing the advanced weapons systems. Total 650 hours accumulated by early 2002, with up to 300 more required for completion.

FAB commitment to purchase 99 ALXs, of which 50 will be two-seat, **AT-29Bs** and 49 will be single-seat **A-29As**. Both versions operated by four squadrons: 2/5^o Grupo de Training Command at Natal AFB, 1/3^o Grupo at Boa Vista, 2/3^o Grupo at Porto Velho; and, from 12 May 2006, 3/3^o Grupo at Campo Grande; Prototype 5700 (the former EMB-314 PP-ZTV), designated **YA-29**, rolled out 28 May 1999; IOC originally intended in



Colombian Air Force Embraer Super Tucano delivered in December 2006

1040392



A-29B advanced trainer version of Embraer Super Tucano (James Goulding)

1158942



Brazilian Air Force Super Tucano (two-seat A-29B) in all-black colour scheme demonstrating in Singapore during 2006 (Paul Jackson)

1040372

May 2001 but FAB formal order only placed (76 firm, plus 23 options) on 8 August 2001; production started February 2002; deliveries began 18 December 2003; total of at least seven A-29As and 32 A-29Bs in service by late 2006. Elbit selected December 1996 to supply mission avionics, including ventral FLIR Systems AN-AAQ-22 turret, GPS/INS, radalt, Mode S transponder, DME, ILS, ADF, VOR, RWR, MAWS and chaff/flare dispenser. Export variants of both versions will be offered for border patrol/COIN missions and for basic/advanced pilot training. Can be flown as single-seat attack aircraft with fuel tank in rear cockpit.

CUSTOMERS: Following Brazil's commitment to 99 ALXs, Dominican Republic announced an order for 10 on 20 August 2001, but later abandoned procurement. Colombia finalized a contract for 25 Super Tucanos on 7 December 2005; delivery of first five was announced one year later, on 7 December 2006; to be followed by batches of 10 in 2007 and 2008. Unsuccessfully demonstrated to Singapore in 2006.

COSTS: Colombian programme cost of USD235 million includes simulator and some instructor training in Brazil.

DESIGN FEATURES: Meets requirements of FAR Pt 23 Appendix A, and MIL and CAA Section K specifications. Low-mounted wings, stepped cockpits in tandem, fully aerobatic. Small fillet forward of tailplane root each side.

EMB-314 differs from EMB-312 mainly in having more powerful engine, reprofiled wing and plugs of 0.37 m (1 ft 2½ in) forward and 1.00 m (3 ft 3¼ in) aft of cockpit to accommodate longer engine and retain CG and stability. Other changes include strengthened airframe for higher g loads and longer fatigue life, potentially 18,000 hours for typical training missions, or 12,000 hours in operational environments, depending on mission loads and utilisation; ventral strakes; five weapons hardpoints; NVG-compatible 'glass cockpit' with HOTAS controls. Able to cover whole primary and half of advanced pilot training syllabus, and fly precision weapons delivery and target towing missions.

Wing section NACA 63-415 at root; NACA 63A-212 at tip.

FLYING CONTROLS: Conventional and manual. Primary surfaces internally balanced; electrically actuated trim tab in, and small geared tab on, each Frise aileron; electromechanically actuated spring tab in rudder and port elevator. Electrically actuated single-slotted Fowler flaps on wing trailing-edges. Fixed incidence tailplane. Ventral airbrake.

STRUCTURE: Conventional all-metal construction from 2024 series aluminium alloys; continuous three-spar wing box forms integral fuel tankage. Steel flap tracks.

LANDING GEAR: Hydraulically retractable tricycle type, with single wheel and Piper oleo-pneumatic shock-absorber on each unit. Accumulator for emergency extension in the event of hydraulic system failure. Hydraulic steering for nose unit. Rearward-retracting steerable nose unit; main units retract inward into wings. Parker Hannifin 40-130 mainwheels. Oldi-DI-1.555-02-OL nosewheel. Tyre sizes 6.50-10 (8 ply) tubeless on mainwheels, 5.00-5 (6 ply) tubeless on nosewheel. Tyre pressures (±0.21 bar; 3 lb/sq in in each case) are 5.17 bar (75 lb/sq in) on mainwheels, 4.48 bar (65 lb/sq in) on nosewheel. Parker Hannifin 30-95A hydraulic mainwheel brakes.

POWER PLANT: ALX: One 1,193 kW (1,600 shp) Pratt & Whitney Canada PT6A-68-3 turboprop, with FADEC, driving a Hartzell five-blade, constant-speed, fully feathering, reversible-pitch propeller.

EMB-314: One 969 kW (1,300 shp) PT6A-68A.

Single-lever combined control for engine throttling and propeller pitch adjustment. Two integral fuel tanks in each wing, total capacity 694 litres (183.3 US gallons; 152.7 Imp gallons). Fuel tanks lined with anti-detonation plastics foam. Optional self-sealing 303 litre (80.0 US gallon; 66.6 Imp gallon) tank in rear cockpit. Single-point pressure refuelling. Fuel system allows nominally for up to 30 seconds of inverted flight. Provision for three ferry fuel tanks (centreline and inboard wing pylons), each total capacity 330 litres (87.1 US gallons; 72.6 Imp gallons).

ACCOMMODATION: Two in tandem, on Martin-Baker Mk 10 LCX zero-zero ejection seats, in air conditioned and pressurised cockpit. One-piece fully transparent vacuum-formed canopy, opening sideways to starboard, with internal and external jettison provisions. Rear seat elevated 25 cm (9.9 in). Dual controls standard. Baggage compartment in rear fuselage, with access via door on port side.

SYSTEMS: Two-axis autopilot with embedded mission planning capability, Freon air cycle conditioning system, with engine-driven compressor. Single hydraulic system, consisting basically of (a) control unit, including reservoir with usable capacity of 1.9 litres (0.5 US gallon; 0.42 Imp gallon); (b) an engine-driven pump with nominal pressure of 131 bar (1,900 lb/sq in) and nominal flow rate of 4.6 litres (1.22 US gallons; 1.01 Imp gallons)/min at 3,800 rpm; (c) landing gear and gear door actuators; (d) filter; (e) shutoff valve; and (f) hydraulic fluid to MIL-H-5606. Under normal operation, hydraulic system actuates landing gear extension/retraction and control of gear doors. Landing gear extension can be performed under emergency operation; emergency retraction also possible during landing and T-O with engine running. Reservoir and system are suitable for aerobatics. No pneumatic system. 28 V DC electrical power provided by a 6 kW starter/generator, 26 Ah battery and, for 115 V and 26 V AC power at 400 Hz, a 250 VA inverter. Onboard oxygen generation system. Canopy and propeller de-icing. Integrated Data Acquisition Recorder (IDAR) includes VCR and FDR functions.

AVIONICS: *Comms:* Standard Rockwell Collins equipment. Integrated nav/com. Tactical VHF/UHF with datalink provisions; transponder.

Flight: Laser INS/dual GPS; twin VOR; ILS; DME; ADF; autopilot.

Instrumentation: Two 152 × 203 mm (6 × 8 in) CMFDs in each cockpit; HUD with up-front control panel in front cockpit. NVG Gen III compatible internal/external lighting. Optional HMD.

Mission: Provision for datalink; video camera and recorder. Embedded mission planning capability. Virtual radar/armament training systems. FLIR. Chaff/flare dispensers; MAWS and RWR.

EQUIPMENT: Landing light in each wing leading-edge; taxiing lights on nosewheel unit. Optional Kevlar cockpit armour.

ARMAMENT: One 12.7 mm machine gun and 200 rounds mounted in each wing. Provision for a variety of ordnance including two Giat NC621 20 mm cannon pods, Mk 81/82 bombs, MAA-1 Piranha AAMs, BLG-252 cluster bombs, SBAT-70/19 or LAU-68A/G rocket pods or MLBs on underwing stations.

DIMENSIONS, EXTERNAL :

Wing span	11.14 m (36 ft 6½ in)
Wing chord: at root	2.30 m (7 ft 6½ in)
at tip	1.07 m (3 ft 6¼ in)
Wing aspect ratio	6.4
Length overall	11.42 m (37 ft 5¾ in)
Fuselage: Length (excl rudder)	10.53 m (34 ft 6½ in)
Max depth	1.86 m (6 ft 1¼ in)
Height overall (static)	3.90 m (12 ft 9½ in)
Tailplane span	4.66 m (15 ft 3½ in)
Wheel track	3.76 m (12 ft 4 in)
Wheelbase	3.36 m (11 ft 0¼ in)
Propeller ground clearance (static)	0.345 m (1 ft 1½ in)
Baggage compartment door:	
Height	0.60 m (1 ft 11½ in)
Width	0.54 m (1 ft 9¼ in)
Height to sill	1.25 m (4 ft 1¼ in)

DIMENSIONS, INTERNAL :

Cockpits: Combined length	2.90 m (9 ft 6½ in)
Max height	1.55 m (5 ft 1 in)
Max width	0.85 m (2 ft 9½ in)
Baggage compartment volume	0.17 m³ (6.0 cu ft)

AREAS:

Wings, gross	19.40 m² (208.8 sq ft)
Ailerons (total)	1.97 m² (21.20 sq ft)
Trailing-edge flaps (total)	2.58 m² (27.77 sq ft)
Fin, incl dorsal fin	2.29 m² (24.65 sq ft)
Rudder, incl tab	1.38 m² (14.85 sq ft)
Tailplane, incl fillets	4.77 m² (51.34 sq ft)
Elevators, incl tab	2.00 m² (21.53 sq ft)

WEIGHTS AND LOADINGS (EMB-314, except where indicated):

Basic weight empty	2,420 kg (5,335 lb)
Max external load	1,500 kg (3,307 lb)
Max internal fuel load (usable)	538 kg (1,186 lb)
Max T-O weight: EMB-314, clean	3,190 kg (7,033 lb)
ALX	3,600 kg (7,936 lb)
Max ramp weight	3,210 kg (7,077 lb)
Max zero-fuel weight: EMB-314	2,670 kg (5,886 lb)
ALX	3,150 kg (6,945 lb)
Max wing loading	164.4 kg/m² (33.68 lb/sq ft)
Max power loading	3.29 kg/kW (5.41 lb/shp)

PERFORMANCE (EMB-314, at max clean T-O weight except where indicated):

Max level speed: EMB-314 at FL200	301 kt (557 km/h; 346 mph)
ALX with external stores	245 kt (454 km/h; 282 mph)
Max cruising speed at FL200	286 kt (530 km/h; 329 mph)
Econ cruising speed at FL200	228 kt (422 km/h; 262 mph)
Stalling speed, power off:	
flaps and landing gear up	85 kt (157 km/h; 98 mph) EAS
flaps and landing gear down	78 kt (145 km/h; 90 mph) EAS
Max rate of climb at S/L	895 m (2,925 ft)/min
Service ceiling	10,670 m (35,000 ft)
T-O run	350 m (1,150 ft)
T-O to 15 m (50 ft)	550 m (1,805 ft)
Landing from 15 m (50 ft)	860 m (2,820 ft)
Landing run	550 m (1,805 ft)
Range at FL300 with max fuel, 30 min reserves	847 n miles (1,568 km; 974 miles)
Ferry range at FL250 with underwing tanks and 30 min reserves	1,495 n miles (2,768 km; 1,720 miles)
Endurance on internal fuel at econ cruising speed at FL250, 30 min reserves	6 h 30 min
g limits: fully Aerobatic category at 2,770 kg (6,107 lb)	+7/-3.5
at 2,770 kg (6,107 lb) with external stores	+4/-2.2

EMBRAER ERJ-135

TYPE: Regional jet airliner.
PROGRAMME:

DEVELOPMENT MILESTONES

Programme launched	16 Sep 97
Rolled out	12 May 98
First flight	4 Jul 98
Certification	Jun 99
First delivery	23 Jul 99

Launched 16 September 1997; two pre-series ERJ-145s (001/PT-ZJA and 002/PT-ZJC) modified to create two prototype ERJ-135s; roll-out (PT-ZJA) 12 May 1998, followed by first flight 4 July 1998; public debut at Farnborough Air Show September 1998; second aircraft (PT-ZJC), flown 24 September 1998, for systems testing before conversion to production standard in March 1999, Brazilian Centro Técnico Aeroespacial (CTA) certification achieved in June 1999; FAA certification (as EMB-135ER and LR) 15 July 1999. First delivery 23 July 1999 to Continental Express; other early aircraft to American Eagle. CTA and JAA approval granted 10 August 2003 for steep approach (5.5° glideslope) operations at London-City Airport.

CURRENT VERSIONS: **ERJ-135:** Regional airliner, as described. Available from the outset in 135ER and 135LR versions.

EMB-135BJ Legacy 600: Corporate version; described separately.

CUSTOMERS: Total of 108 firm commercial orders by 31 December 2006. See table. Additionally, one VIP-configured ERJ-135LR handed over to Greek Air Force on 7 January 2000 and two, also in VIP configuration, to the Belgian Air Force on 4 June and in August 2001, for operation by No. 21 Squadron at Melsbroek with two similarly configured ERJ-145s. Deliveries have been 16 in 1999, 45 in 2000, 27 in 2001, three in 2002, 14 in 2003, one in 2004, two in 2005, none in 2006.

Programme based on estimates of 500 sales.

COSTS: Development cost USD100 million, of which 40 per cent provided by risk-sharing partners. Unit cost USD11.8 million.

DESIGN FEATURES: Shares 96 per cent commonality with ERJ-145 including engines, wings, tail surfaces, flight deck and main systems; fuselage shortened by 3.53 m (11 ft 7 in) by removal of two frames (4.84 m; 15 ft 10½ in ahead of wing and 3.07 m; 10 ft 0¾ in at rear) and substitution of two shorter frames (2.85 m; 9 ft 4¼ in and 1.53 m; 5 ft 0¼ in, respectively).

FLYING CONTROLS: As for ERJ-145.

STRUCTURE: As for ERJ-145.

LANDING GEAR: As for ERJ-145.

POWER PLANT: Two 33.7 kN (7,580 lb st) Rolls-Royce AE 3007A3 or AE 3007A1/3 turbofans. Fuel as ERJ-145ER and ERJ-145LR, respectively.

ACCOMMODATION: Standard accommodation for 37 passengers in three-abreast configuration. SYSTEMS: As for ERJ-145.

DIMENSIONS, EXTERNAL: As for ERJ-145 except:

Length: overall	26.33 m (86 ft 4½ in)
fuselage	24.39 m (80 ft 0¼ in)
Wheelbase	12.43 m (40 ft 9¼ in)

DIMENSIONS, INTERNAL:

Cabin (excl flight deck and baggage compartment, incl lavatory):	
Length	12.95 m (42 ft 5¾ in)
Baggage compartment: Length	3.34 m (10 ft 11½ in)
Baggage volume:	
wardrobe and stowage compartment	1.0 m³ (35 cu ft)
overhead bins	1.4 m³ (49 cu ft)
underseat	1.7 m³ (60 cu ft)
Galley volume	0.99 m³ (35 cu ft)



Embraer ERJ-135 of American Airlines (Paul Jackson)

1040375

WEIGHTS AND LOADINGS:

Operating weight empty:	
ERJ-135ER	11,390 kg (25,111 lb)
ERJ-135LR	11,490 kg (25,331 lb)
Max baggage weight	1,000 kg (2,205 lb)
Max payload: ERJ-135ER	4,270 kg (9,414 lb)
ERJ-135LR	4,510 kg (9,943 lb)
Max fuel weight: ERJ-135ER	4,173 kg (9,200 lb)
ERJ-135LR	5,187 kg (11,435 lb)
Max T-O weight: ERJ-135ER	19,000 kg (41,888 lb)
ERJ-135LR	20,000 kg (44,092 lb)
Max landing weight:	
ERJ-135ER, ERJ-135LR	18,500 kg (40,785 lb)
Max ramp weight: ERJ-135ER	19,100 kg (42,108 lb)
ERJ-135LR	20,100 kg (44,313 lb)
Max zero-fuel weight: ERJ-135ER	15,600 kg (34,392 lb)
ERJ-135LR	16,000 kg (35,274 lb)
Max wing loading:	
ERJ-135ER	371.2 kg/m² (76.04 lb/sq ft)
ERJ-135LR	390.8 kg/m² (80.04 lb/sq ft)
Max power loading:	
ERJ-135ER	282 kg/kN (2.76 lb/lb st)
ERJ-135LR	297 kg/kN (2.91 lb/lb st)

PERFORMANCE:

Max cruising speed	M0.78 (450 kt; 833 km/h; 518 mph)
Time to FL350	20 min
Max certified altitude	11,275 m (37,000 ft)
T-O field length at S/L	1,700 m (5,577 ft)
Landing field length, S/L, at typical landing weight	1,360 m (4,460 ft)
Range with 37 passengers, 100 n mile (185 km; 115 mile) diversion, 45 min reserves	1,700 n miles (3,148 km; 1,956 miles)

EMBRAER EMB-135BJ LEGACY 600

TYPE: Business jet.
PROGRAMME:

DEVELOPMENT MILESTONES

Announced	23 Jul 00
First flight	31 Mar 01
Certification	10 Dec 01

Announced on eve of Farnborough International Air Show 23 July 2000; first flight of prototype (PP-XJO), converted from second ERJ-135 prototype (PT-ZJC); 31 March 2001; Brazilian CTA certification achieved 10 December 2001, followed by JAA certification on 9 July. FAA approval on 23 August 2002, and Russian Interstate Aviation Committee approval on 18 November 2003. Indonesian certification granted 19 June 2006. Early aircraft limited to MTOW of 22,200 kg (48,942 lb); increased by 300 kg (661 lb) from c/n 145625).

Improvements introduced in 2003 included removal of windscreen wipers, redesign of fairings and air inlets, polishing of wing leading-edges and surface smoothing, resulting in 50 n mile (93 km; 58 mile) increase in maximum range in Executive configuration.

Renamed Legacy 600 at the NBAA Convention at Orlando, Florida 9 November 2005.

CURRENT VERSIONS: Offered in **Corporate**, **Shuttle** and **Shuttle HC** variants.

CUSTOMERS: Total of 76 delivered by 18 July 2006 to customers in 18 countries. Launch customer Swift Aviation of Phoenix, Arizona, ordered 25, with 25 options in July 2000; other announced customers include an unnamed major energy company based in Houston, Texas, which ordered one in corporate shuttle configuration in April 2001; the Greek Air Force, which ordered one in Executive configuration for delivery in December 2001; Sheikh Fahad Al Athel of Saudi Arabia, who took delivery of one on 16 December 2002; the Indian Government, which ordered five in Executive configuration on 19 September 2003, four of which will replace HAL/Avro 748s with the Indian Air Force's Air HQ Communications Squadron at Palam, and one operated by the Border Security force; and fractional ownership operator flight options, which signed an MoU on 27 October 2003 for up to four in Executive configuration. Recent customers include ABJ of the Czech Republic (one), Fransabank SAL of the Lebanon (one), Celitel International of Kuwait (one), the Government of India (three), and PT Ekspres Transportasi Antarbenua of Indonesia (one). Total of 27, including one Shuttle, delivered during 2006.

COSTS: Shuttle USD18.6 million to USD19.35 million; Executive USD24.7 million (all 2007). Description for ERJ-135 applies also to the Legacy 600, except the following.



Indian Air Force Embraer Legacy 600

1040378

DESIGN FEATURES: Compared with ERJ-135 Legacy Executive has belly and aft fuel tanks in extended underwing fairing, plus winglets.

STRUCTURE: Airframe manufactured as ERJ-135 and modified to Legacy configuration; Embraer performs interior completion, using components supplied by Nordam or Duncan Aviation.

POWER PLANT: Legacy Executive initially had two 37.1 kN (8,338 lb st) Rolls-Royce AE 3007A1P turbofans; from c/n 145625, two AE 3007A1Es, each 39.7 kN (8,917 lb st). Legacy Shuttle has two 33.7 kN (7,580 lb st) AE 3007 A1/3s. Legacy Executive initially 10,152 litres (2,682 US gallons; 2,233 Imp gallons). Increased from c/n 145625 to 10,266 litre (2,712 US gallons; 2,258 Imp gallons) in two wing- and two forward fuselage tanks, usable capacity 10,160 litres (2,684 US gallons; 2,235 Imp gallons). Legacy Shuttle has 6,397 litres (1,690 US gallons; 1,407 Imp gallons) of usable fuel.

ACCOMMODATION: Typical accommodation for 13 passengers in Legacy 600 Executive configuration. Legacy 600 Shuttle can accommodate 16 to 19 in two-abreast arrangement, or 30 to 37 in three-abreast configuration. Baggage compartment and lavatory at rear of cabin. Cabin equipment includes full-size galley for hot and cold meals, aft lavatory, wardrobe and storage cabinet, and entertainment system with DVD players, Satcom, HSD and Wi-Fi internet connectivity.

SYSTEMS: Hamilton Sundstrand T-62T-40C14 APU.

AVIONICS: Honeywell Primus 1000 as core system.

DIMENSIONS, INTERNAL (A: 600 Executive, B: 600 Shuttle):

Cabin volume: B	40 m ³ (1,413 cu ft)
Baggage compartment volume: A	6.80 m ³ (240 cu ft)
B	9.20 m ³ (325 cu ft)

WEIGHTS AND LOADINGS:

Basic operating weight: A	13,600 kg (29,983 lb)
B	11,500 kg (25,353 lb)
Max baggage weight: A	454 kg (1,001 lb)
B	1,000 kg (2,205 lb)
Max payload: A	2,400 kg (5,291 lb)
B	4,500 kg (9,921 lb)
Max fuel weight: A	8,242 kg (1,817 lb)
B	5,135 kg (11,321 lb)
Payload with max fuel: A	728 kg (1,605 lb)
B	3,465 kg (7,639 lb)
Max ramp weight: A	22,570 kg (49,758 lb)
B	20,100 kg (44,313 lb)
Max T-O weight: A	22,500 kg (49,604 lb)
B	20,000 kg (44,092 lb)
Max landing weight: A, B	18,500 kg (40,785 lb)
Max zero-fuel weight: A, B	16,000 kg (35,274 lb)
Max wing loading: A	439.6 kg/m ² (90.04 lb/sq ft)
B	390.8 kg/m ² (88.04 lb/sq ft)
Max power loading: A	283.5 kg/kN (2.78 lb/lb st)
LR	296.7 kg/kN (2.91 lb/lb st)

PERFORMANCE:

Cruising speed: A at FL390	
A	M 0.80 (459 kt; 850 km/h; 528 mph)
B at FL370	M 0.78 (447 kt; 828 km/h; 514 mph)
Max certified altitude: A, B	12,500 m (41,000 ft)
T-O field length	1,692 m (5,551 ft)
Landing field length: A, B	817 m (2,681 ft)
Range with NBAA IFR reserves:	
A with 8 pax	3,250 n miles (6,019 km; 3,740 miles)
B with 16 pax	1,840 n miles (3,408 km; 2,117 miles)

EMBRAER ERJ-140

TYPE: Regional jet airliner.

PROGRAMME:

DEVELOPMENT MILESTONES

Programme launched	20 Sep 99
First flight	27 Jun 00
Certification	Jun 01
First delivery	Jul 01

Launched 30 September 1999 at the European Regional Airline Association annual meeting in Paris; first flight of prototype, modified from prototype ERJ-135 c/n 801/PT-ZJA, 27 June 2000; public debut at Farnborough International Air Show July 2000; Brazilian CTA and FAA certification (for both ER and LR versions) achieved in June and 26 July 2001 respectively; first delivery (PP-XGF/N800AE) to American Eagle late July 2001.

CURRENT VERSIONS: **ERJ-140ER**: Standard version, as described. Engineering designation EMB-135KE.

ERJ-140LR: Long-range version. Engineering designation EMB-135KL.

CUSTOMERS: Launch customer American Eagle announced order for 66 on 27 September 2000, subsequently reduced to 59 through conversion of orders and options to ERJ-145s. Total of 74 firm orders, all of which had been delivered, by 31 December 2006. See table.

COSTS: USD15.2 million (1999).

Descriptions for the ERJ-135 and ERJ-145 apply also to the ERJ-140 except as follows: DESIGN FEATURES: Shares 98 per cent commonality with ERJ-135/145, including engines, wings, tail surfaces, flight deck and main systems; ERJ-135 fuselage stretched by 2.30 m (7 ft 6½ in) by removal of two frames (2.85 m; 9 ft 4¼ in ahead of wing and 1.35 m; 4 ft 5 in at rear) and substitution of two longer frames (3.94 m; 12 ft 11 in and 2.56 m; 8 ft 4¾ in respectively).

POWER PLANT: Rolls-Royce AE 3007A1/3 turbofans, each rated at 33.7 kN (7,580 lb st); fuel as ERJ-145ER/MR and 145LR, respectively.

ACCOMMODATION: Standard accommodation for 44 passengers, three-abreast at seat pitch of 39 cm (31 in). Flight attendant seat on port side immediately aft of flight deck standard; attendant seat in centre of aisle at rear of cabin optional. Wardrobe/carry-on baggage cabinet and galley at front of cabin, lavatory at rear.

DIMENSIONS, EXTERNAL:

Length: overall	28.47 m (93 ft 5 in)
fuselage	26.52 m (87 ft 0 in)
Wheelbase	13.51 m (44 ft 4 in)

DIMENSIONS, INTERNAL:

Baggage volume:	
Wardrobe and stowage compartment	0.93 m ³ (32.84 cu ft)

WEIGHTS AND LOADINGS:

Basic operating weight: ER, LR	11,800 kg (26,014 lb)
Baggage capacity	1,200 kg (2,646 lb)

Max fuel weight: ER	4,173 kg (9,200 lb)
LR	5,187 kg (11,435 lb)
Max T-O weight: ER	20,100 kg (44,312 lb)
LR	21,100 kg (46,517 lb)
Max landing weight: ER, LR	18,700 kg (41,226 lb)
Max ramp weight: ER	20,200 kg (44,533 lb)
LR	21,200 kg (46,738 lb)
Max zero-fuel weight: ER, LR	17,100 kg (37,699 lb)
Max wing loading: ER	392.7 kg/m ² (80.44 lb/sq ft)
LR	412.3 kg/m ² (84.44 lb/sq ft)
Max power loading: ER	298 kg/kN (2.92 lb/lb st)
LR	313 kg/kN (3.07 lb/lb st)

PERFORMANCE:

Max cruising speed: ER, LR	Mach 0.78 (450 kt; 833 km/h; 518 mph)
T-O field length: ER	1,720 m (5,643 ft)
LR	1,320 m (4,331 ft)
Time to climb to 10,670 m (35,000 ft): ER, LR	16 min
Service ceiling: ER, LR	11,278 m (37,000 ft)
Range with 44 passengers at long-range cruising speed 100 n mile (185 km; 115 mile) alternate and 45 min reserves:	
ER	1,230 n miles (2,278 km; 1,415 miles)
LR	1,630 n miles (3,018 km; 1,875 miles)

EMBRAER ERJ-145

Brazilian Air Force designations: R-99A, R-99B and P-99

TYPE: Regional jet airliner.

PROGRAMME:

DEVELOPMENT MILESTONES

Announced	12 June 89
First prototype material cut	2Q 93
First flight	11 Aug 95
Officially rolled out	18 Aug 95
Certification	10 Dec 96
First delivery	19 Dec 96

Development plans revealed 12 June 1989, aimed at first flight late 1991 and first deliveries mid-1993; programme delayed by company cutbacks, complete redesign of wing and other changes, as described in 2000-01 and earlier *Jane's*.

First metal cut for prototype, and tooling fabrication, in second quarter 1993; assembly of prototype (PT-ZJA) began October 1994; fuselage sections mated January 1995; first flight 11 August 1995 ahead of formal roll-out and 'official' first flight a week later; first of three pre-series aircraft (PT-ZJB) first flown 17 November 1995; second ('ZJC') flew on 14 February and third ('ZJD') 2 April 1996; FAA and Brazilian CTA certification (to FAR/JAR 25, FAR Pt 36, ICAO Annex 16 and FAR Pt 121) achieved 10 December 1996. Single prototype and three pre-series aircraft undertook a 1,600 hour, 13 month development flight testing and certification programme. Deliveries began on 19 December 1996 with two aircraft (N15925 and N15926) to US launch customer Continental Express. Designation changed from EMB-145 to ERJ-145 in October 1997 to reflect 'Regional Jet' terminology, although former is retained for corporate and military variants. Certified by the aviation authorities of 27 countries by September 1998.

In addition to its suitability for executive transport and corporate shuttle roles, Embraer foresees military potential for the ERJ-145 as a tanker aircraft for small combat units, and as an AEW, elint, comint, sigint or battlefield surveillance platform. See Current Versions.

Two static test airframes: first (802) completed trials on 30 August 1996; second (803) began 10 year programme in December 1996.

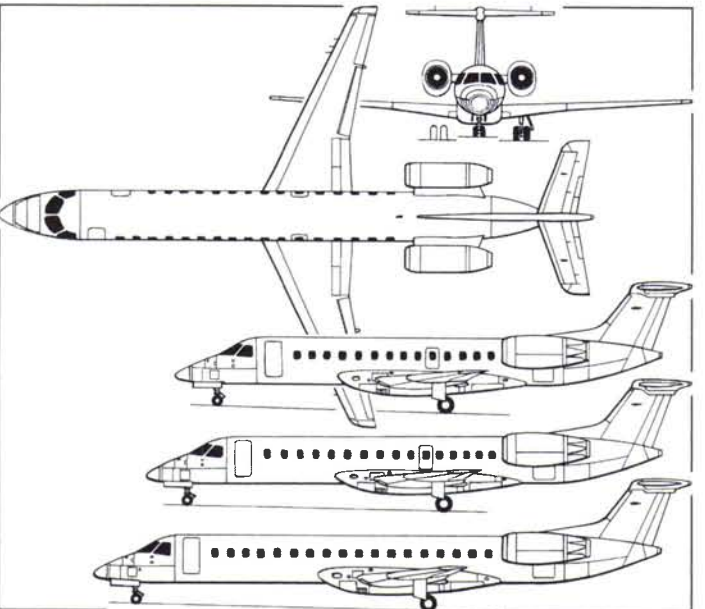
ERJ series achieved 10 million flight hours in November 2006.

CURRENT VERSIONS: **ERJ-145**: Initial version. Certified (by FAA) 10 December 1996 at 19,200 kg (42,328 lb) MTOW.

ERJ-145ER: (Extended Range) FAA co-certification 10 December 1996 at 20,600 kg (45,415 lb) MTOW.

ERJ-145MR: Certified by FAA 7 May 1998 at 22,000 kg (48,501 lb) MTOW. Two only, subsequently converted to ERJ-145LR standard. See ERJ-145MP, below.

ERJ-145LR: (Long Range) FAA co-certification 7 May 1998 for full passenger payload range of 1,640 n miles (3,037 km; 1,887 miles); increases in fuel capacity and all operating weights; 22,000 kg (48,501 lb) MTOW; and uprated AE 3007A1 turbofans providing 15 per



ERJ-145 rear-engined twin-turbopfan regional airliner with additional side views of ERJ-135 (top) and ERJ-140 (centre) (James Goulding)

1158943



Embraer ERJ-145 of China's Sichuan Airlines

1040385

cent more thermodynamic power, but flat rated to 33.1 kN (7,430 lb st), for improved climb and hot weather cruise performance.

ERJ-145MP: Combines ERJ-145LR's fuselage, zero-fuel weight and maximum landing weight with ERJ-145ER's landing gear, fuel tanks and range. Maximum take off weight 20,990 kg (46,275 lb). Available from 1999 as replacement for ERJ-145MR.

ERJ-145XR: (Extra Long Range) Announced at Farnborough International Air Show 25 July 2000 with launch order for 75, plus 100 options, from Continental Express subsequently increased to 104, plus 100 options. Features strengthened fuselage, wings and horizontal stabiliser, winglets, uprated AE 3007A1E turboprops providing lower specific fuel consumption, improved hot-and-high operation and higher single-engine ceiling; and auxiliary fuel tank in wing/fuselage fairing. Prototype (PT-ZJB, modified from first pre-series ERJ-145) first flown 29 June 2001; first production aircraft (c/n 590) flew early April 2002; two aircraft took part in a 400 hour test programme, Brazilian CTA granted 3 September 2002, followed by FAA approval 22 October 2002, and first deliveries to Continental Express/ExpressJet, which was scheduled to receive 18 ERJ-145XRs by the end of 2002.

ERJ-145EP: FAA certification 14 October 2003. MTOW 20,990 kg (46,275 lb); max ramp weight 21,090 kg (46,495 lb); MLW 18,700 kg (41,226 lb); MZFW 17,100 kg (37,699 lb); fuel as ER/MR versions.

ERJ-135: Short-fuselage, 37-seat version; *described separately*.

ERJ-140: Mid-size, 44-seat version; *described separately*.

EMB-145AEW&C: Formerly EMB-145SA; Brazilian Air Force designation **R-99A**. Airborne early warning and remote sensing version of ERJ-145LR developed for Brazilian government's *Sistema de Vigilância de Amazônia* (SIVAM) programme for which Raytheon is prime contractor; initial requirement for five; contract signature March 1997. Selected on 15 December 1998 by Greek Air Force for its four-aircraft AEW requirement, with delivery from 2002; contract, signed 1 July 1999, valued at USD500 million. Announced late 1996 and features a strengthened fuselage, ventral strakes, more powerful APU, increased fuel capacity (three extra tanks at extreme rear of cabin, plus jettison capability), extending endurance to more than 8 hours; enhanced electrical system, five seats for relief crew and four (with provision for additional two) operators' consoles, including tactical co-ordinator. Flight crew of two.

Mission systems comprise civil version of Ericsson PS-890 Erieye side-looking airborne radar with antenna housed in long overfuselage fairing, optimised for lower-speed targets typically encountered in border incursions; five Erieye systems purchased at cost of USD145 million in 1997 for installation in EMB-145SAs, with first system delivery scheduled for 1999. Onboard command and control system, and BAE Systems North America Comms-Non Comms system. Radar is pulse Doppler type, operating in E/F-band, offering coverage from very low level up to about 25,000 m (82,000 ft) and at ranges exceeding 162 n miles (300 km; 186 miles). Datalink; GPS; secure communications. Second airframe (PP-XSA/6702) was first to fly, on 22 May 1999, ahead of formal roll-out on 28 May. Following systems integration by Raytheon in USA, first two R-99As and one R-99B handed over to 2º/6º Grupo at Anápolis on 24 July 2002; third and fourth R-99As followed in December 2002 and last on 12 December 2003.

Greek selection of Erieye-equipped EMB-145 announced 1 July 1999; four aircraft ordered, of which first handed over on 16 October 2003 to begin equipment outfitting.

Mexican government order for one EMB-145AEW&C announced 1 March 2001; equipment includes comint system installed by Raytheon.

EMB-145RS: Brazilian Air Force designation **R-99B**. Remote sensing version, of which three ordered for FAB's SIVAM programme for delivery commencing first quarter 2001. Similar to AEW variant, and with ventral strakes, but different mission systems for primary roles in natural resources exploitation, environmental and river pollution control, economic activities, ground occupation monitoring and illegal activities surveillance. Main sensor is version of Canadian MacDonald Dettwiler IRIS (Integrated Radar Imaging System) synthetic aperture radar, installed in underfuselage bulge with auxiliary antennas beneath wingroots, operating in D-band interferometric mode and capable of generating 3-D imagery. Other main sensors include Star Safire FLIR mounted behind nosewheel bay, Daedalus ultraviolet/visible/infrared linescanner and BAE Systems North America Comms-Non Comms system. Roll-out (PP-XRT/6751) November 1999, with first delivery to 2º/6º Grupo at Anápolis AFB on 24 July 2002; all received by late 2003.

EMB-145AGS: Airborne ground sensor version, under study during 2000; equipped with a mission package comprising Airborne Platform Subsystem (APS), Airborne Mission Equipment Subsystem (AMES) and Ground Exploitation Station Subsystem (GESS) including HF, UHF, VHF, ELINT and IMINT equipment, providing a self-deployable and cost-effective surface reconnaissance system.

EMB-145 airframe selected as aerial platform for Lockheed Martin's and Harris Corporation's bid for US Army Aerial Common Sensor (ACS) requirement, designed to replace Guardrail Common Sensor and Airborne Reconnaissance Low intelligence, surveillance and reconnaissance systems.

EMB-145MP and EMB-145MP/ASW: Brazilian Air Force designation **P-99**. Maritime patrol and anti-submarine warfare versions, under development by 2000; equipped with surveillance radar with multiple target track-while-scan mode, autodetection, FLIR interface, digital map, incorporated tactical aids, SAR/ISAR mode allowing real-time imaging, adaptive processing for different sea states, and simultaneous side and range views; high-altitude and resolution FLIR; ESM suite; COMINT/ELINT; MAD; IFF/SSR and acoustics.

Mexican government order for two EMB-145MPs announced 1 March 2001. Equipment includes SeaVue radar and AN/APX-114 IFF interrogator to be installed by Raytheon at Greenville. FAA Type Certificate granted 3 July 2003; AE3007A, A1/1, A1/2, A1 or A1P engines; MTOW 20,990 kg (46,275 lb); max ramp weight 21,090 kg (46,495 lb); MLW 19,300 kg (42,549 lb); MZFW 17,900 kg (39,462 lb).

CUSTOMERS: Total of 914 firm orders and 133 options for ERJ-135, ERJ-140 and ERJ-145 commercial variants by 31 December 2006, of which 861 then delivered. See table. Four hundredth ERJ series delivery was an ERJ-145 (HB-JAL) to Crossair on 22 March 2001; 500th was an ERJ-145 (N2933K) delivered to Chautauqua Airlines of Indiana on 21 September 2001; 600th to Swiss (as HB-JAY) on 28 May 2002, and 700th to Alitalia Express (as I-EXML) on 9 May 2003, 800th (ERJ-145) to Chautauqua Airlines on 13 May 2004, and 900th (ERJ-135) to Luxair on 28 February 2005.

EMBRAER ERJ-135/140/145 ORDERS AND DELIVERIES
(at 31 December 2006)

Customer	Variant	Ordered	Del'd	Backlog
Aerolitoral	145	5	5	
Air Caraibes	145	2	2	
Alitalia Express	145	14	14	
American Eagle	135	40	40	
	140	59	59	
	145	118	118	
Axon Airlines	145	3	3	
bmi (British Midland)	135	3	3	
	145	9	9	
British Regional	145	23	23	
Brymon Airways	145	7	7	
China Southern Jiangsu	145	6	6	
China Eastern	145	5	5	
China Eastern Wuham	145	5	2	3
Cirrus Airlines	145	1	1	
City Airlines AB Sweden	135	2	2	
ERA Spain	145	2	2	
ExpressJet	135	30	30	
	145	245	245	
Flandre Air	135	3	3	
	145	5	5	
GECAS (PB Air Thailand)	145	2	2	
HNA Group China	145	50	0	50
Jet Magic	135	1	1	
KLM Exel	145	2	2	
LOT Polish	145	14	14	
Luxair	135	2	2	
	145	9	9	
Mesa	145	36	36	
Pan Européenne	135	1	1	
Portugalía	145	8	8	
Proteus	135	3	3	
	145	8	8	
Regional Airlines (France)	135	3	3	
	145	15	15	
Republic Airways (Management)	135	15	15	
	140	15	15	
	145	60	60	
Rheintalflug	145	3	3	
Rio-Sul	145	16	16	
Satena	145	3	3	
Sichuan Airlines	145	5	5	
Skyways AB	145	4	4	
South African				
Airlink	135	5	5	
Swiss	145	25	25	
Trans States Airlines	145	22	22	
Totals	914	861	53	
of which	135	914	861	53
	140	74	74	
	145	732	679	53

Notes: Total excludes military versions, EMB-135/145s in corporate service and Legacys.

COSTS: Estimated development costs USD300 million.

Following description applies to ERJ-145ER except where indicated.

DESIGN FEATURES: Stretched EMB-120 Brasília fuselage (with tailcone adapted for rear-mounted engine installation), allied to new-design wing with Embraer supercritical section; CBA-123 nose and cabin; T tailplane.

Wing sweepback 22° 43' 48" at quarter-chord.

FLYING CONTROLS: Conventional and assisted. Ailerons and two-section rudder hydraulically actuated, with artificial feel; mechanically actuated elevator with automatic and spring tab.

Four-segment in-flight and ground spoilers; two pairs of electrically actuated double-slotted flaps. Control surface movements: ailerons +25/-15°, elevators +27/-14°, rudder ±15° (first segment) ±11° 15' (second segment), flaps +7° 30'/-45° (inboard) +9° 10'/-45° (outboard), spoilers +52° (inboard) +30° (outboard).

STRUCTURE: Fuselage as for Brasília; two-spar wing with integral fuel tanks, plus auxiliary third spar supporting landing gear; T tail unit with aluminium main boxes; wing and tailplane leading-edges aluminium, fin leading-edge composites sandwich. Gamesa (Spain) builds wings, wing/body fairings, main landing gear doors and engine nacelles; rear fuselage section 1, including engine pylons and passenger/service/baggage doors, plus centre-fuselage section 1, including doors, by Sonaca (Belgium); fin, tailplane and elevators by ENAER (Chile); engine nacelles and thrust reversers by Huel Hispano UK; nose radome by Norton; passenger cabin and baggage compartment interiors by C & D Interiors (USA). Structure designed for an economical service life of 60,000 flights.

LANDING GEAR: Twin-wheel main legs retract inward into wing/fuselage fairings; twin-wheel nose unit retracts forward. EDE/Liebherr landing gear system, with EDE responsible for whole system and Liebherr for development and production of nose unit. Goodrich wheels and carbon brakes. Tyre sizes 30x9.5-14 (16 ply) tubeless (main), 19.5x6.75-8 (8 ply) tubeless (nose); tyre pressure 8.60 to 9.00 bar (125 to 130 lb/sq in). Minimum ground turning radius at nosewheel 12.51 m (41 ft 0 in). Minimum turning circle 29.22 m (95 ft 10½ in).



Portuguese national colours on Embraer ERJ-145 of PGA

1040386

POWER PLANT: Two turbofans pylon-mounted on rear cone of ERJ-145ER, 145MR and 145LR have 33.7 kN (7,580 lb st), Rolls-Royce AE 3007A, 3007A1/1 or 3007A1/2 as standard; 37.1 kN (8,338 lb st) AE 3007A1P optional, all with FADEC. ERJ-145XR has two 39.6 kN (8,895 lb st) AE 3007A1Es. Clamshell-type thrust reversers optional.

Parker Hannifin fuel system. Fuel capacity of ER and MR 5,201 litres (1,374 US gallons; 1,144 Imp gallons) in two wing tanks; usable fuel 5,091 litres (1,345 US gallons; 1,120 Imp gallons). ERJ-145LR capacity increased to 6,439 litres (1,701 US gallons; 1,418 Imp gallons); 6,352 litres (1,678 US gallons; 1,397 Imp gallons) usable. ERJ-145XR fuel comprises two wing tanks, each of 3,199 litres (845 US gallons; 704 Imp gallons), plus 1,037 litre (274 US gallon; 228 Imp gallon) ventral tank, for total of 7,435 litres (1,964 US gallons; 1,635 Imp gallons), of which 7,382 litres 1,950 US gallons; 1,624 Imp gallons) usable.

ACCOMMODATION: Two pilots, flight observer and cabin attendant. Standard accommodation for 50 passengers, three-abreast at seat pitch of 79 cm (31 in). Carry-on baggage wardrobe, galley and cabin attendant's seat at front of cabin; lavatory and main baggage compartment at rear of cabin. Cabinet plus overhead bins carry-on baggage capacity 358 kg (789 lb); underseat capacity 450 kg (992 lb); main baggage compartment capacity 1,200 kg (2,646 lb). Additional baggage cabinet or galley capacity can be provided by removing one or two single forward passenger seats. Outward-opening plug-type door, incorporating airstair, at front on port side, identical to that of EMB-120; upward-sliding baggage door at rear on port side; sideways-opening service door at front on starboard side; inward-opening emergency exit above wing on each side. Entire accommodation, including baggage compartments, pressurised and air conditioned.

SYSTEMS: Liebherr Aerospace pressurisation system (maximum differential 0.54 bar; 7.8 lb/sq in) maintains 2,440 m (8,000 ft) cabin altitude to 11,275 m (37,000 ft). Hamilton Sundstrand air conditioning and bleed air systems (wing and tailplane leading-edges and engine intakes anti-iced by engine bleed air); electric anti-icing system for windscreen and static and pitot tubes and sensors. Lucas electrical power generation system. Hamilton Sundstrand T-62T-40C11 or C14 APU. Honeywell air turbine starter. Parker Hannifin flight control and steering systems. Hydro-Aire brake-by-wire control system. EROS oxygen system.

AVIONICS: Honeywell Primus 1000 as core system.

Comms: Dual Primus II radios and radio management units.

Radar: Primus 1000 colour weather radar.

Flight: Dual digital air data computers, dual AHRS, TCAS and GPWS standard. FMS/GPS optional. Flight Dynamics HUD selected April 1998 for certification in 2000, providing Cat. III landing capability.

Instrumentation: EFIS panel comprising five 280 × 180 mm (11 × 7 in) displays, two PFDs, two MFDs and IECAS.

DIMENSIONS, EXTERNAL:

Wing span: ERJ-145ER/LR	20.04 m (65 ft 9 in)
ERJ-145XR over winglets	21.01 m (68 ft 11 in)
Wing chord: at root	4.09 m (13 ft 5 in)
at tip	1.04 m (3 ft 5 in)
Wing aspect ratio	7.9
Length overall	29.87 m (98 ft 0 in)
Fuselage: Length	27.93 m (91 ft 7½ in)
Max diameter	2.28 m (7 ft 5¾ in)
Height overall	6.76 m (22 ft 2 in)
Tailplane span	7.55 m (24 ft 9 in)
Wheel track (c/l of shock-struts)	4.10 m (13 ft 5½ in)
Wheelbase	14.45 m (47 ft 5 in)
Passenger door (fwd, port): Height	1.70 m (5 ft 7 in)
Width	0.71 m (2 ft 4 in)
Height to sill (max)	1.63 m (5 ft 4 in)
Baggage door (rear, port): Height	1.12 m (3 ft 8 in)
Width	1.00 m (3 ft 3¼ in)
Height to sill (max)	1.76 m (5 ft 9¼ in)
Service door (rear, stbd): Height	1.42 m (4 ft 8 in)
Width	0.62 m (2 ft 0½ in)
Height to sill	1.60 m (5 ft 3 in)
Emergency exits (overwing, each):	
Height	0.92 m (3 ft 0¼ in)
Width	0.51 m (1 ft 8 in)

DIMENSIONS, INTERNAL:

Cabin (excl flight deck and baggage compartment, incl lavatory):	
Length	16.49 m (54 ft 1¼ in)
Max width	2.10 m (6 ft 10¾ in)
Max height	1.83 m (6 ft 0 in)
Max aisle width	0.52 m (1 ft 8½ in)
Floor area	25.7 m² (277 sq ft)
Volume	53.0 m³ (1,872 cu ft)
Baggage compartment: Length	3.26 m (10 ft 8¼ in)
Baggage volume:	
wardrobe and stowage compartment	1.4 m³ (49 cu ft)
overhead bins	1.9 m³ (67 cu ft)

underseat	2.3 m³ (80 cu ft)
baggage compartment	9.2 m³ (325 cu ft)
AREAS:	
Wings, gross	51.18 m² (550.9 sq ft)
Ailerons (total)	1.70 m² (18.30 sq ft)
Trailing-edge flaps (total)	8.36 m² (89.99 sq ft)
Spoilers (total)	2.32 m² (24.97 sq ft)
Fin	5.07 m² (54.57 sq ft)
Rudder	2.13 m² (22.93 sq ft)
Tailplane	11.20 m² (120.55 sq ft)
Elevators (total, incl tabs)	3.34 m² (35.95 sq ft)

WEIGHTS AND LOADINGS:

Operating weight empty:	
ERJ-145ER	11,940 kg (26,323 lb)
ERJ-145LR	12,100 kg (26,676 lb)
ERJ-145XR	12,580 kg (27,734 lb)
Max baggage weight	1,200 kg (2,646 lb)
Max payload: ERJ-145ER	5,160 kg (11,376 lb)
ERJ-145LR	5,800 kg (12,787 lb)
ERJ-145XR	5,920 kg (13,051 lb)
Max fuel: ERJ-145ER	4,173 kg (9,200 lb)
ERJ-145LR	5,187 kg (11,435 lb)
ERJ-145XR	6,032 kg (13,298 lb)
Max T-O weight: ERJ-145ER	20,600 kg (45,415 lb)
ERJ-145LR	22,000 kg (48,500 lb)
ERJ-145XR	24,100 kg (53,131 lb)
Max ramp weight: ERJ-145ER	20,700 kg (45,635 lb)
ERJ-145LR	22,100 kg (48,721 lb)
ERJ-145XR	24,200 kg (53,351 lb)
Max landing weight: ERJ-145ER	18,700 kg (41,226 lb)
ERJ-145LR	19,300 kg (42,549 lb)
ERJ-145XR	20,000 kg (44,092 lb)
Max zero-fuel weight:	
ERJ-145ER	17,100 kg (37,698 lb)
ERJ-145LR	17,900 kg (39,463 lb)
ERJ-145XR	18,500 kg (40,785 lb)
Max wing loading:	
ERJ-145ER	402.5 kg/m² (82.44 lb/sq ft)
ERJ-145LR	429.8 kg/m² (88.04 lb/sq ft)
ERJ-145XR	470.9 kg/m² (96.44 lb/sq ft)
Max power loading:	
ERJ-145ER, ERJ-145XR	305 kg/kN (3.00 lb/lb st)
ERJ-145LR	326 kg/kN (3.20 lb/lb st)

PERFORMANCE:

High cruising speed: ERJ-145ER, ERJ-145LR	M0.78 (450 kt; 833 km/h; 518 mph)
ERJ-145XR	M0.80
Time to climb to FL350	20 min
Max certified altitude: all	11,275 m (37,000 ft)
Service ceiling, OEI: ERJ-145ER/LR	6,100 m (20,000 ft)
FAR T-O field length at S/L:	
ERJ-145ER/LR	1,970 m (6,465 ft)
ERJ-145XR	2,089 m (6,855 ft)
FAR landing field length, S/L, at typical landing weight:	
ERJ-145ER/LR	1,390 m (4,560 ft)
ERJ-145XR	1,430 m (4,692 ft)
Range, 50 passengers, 100 n mile (185 km; 115 mile) diversion, 45 min reserves:	
ERJ-145LR	1,620 n miles (3,000 km; 1,864 miles)
ERJ-145XR	2,000 n miles (3,704 km; 2,301 miles)

EMBRAER 170 and 190

TYPE: Regional jet airliner.

PROGRAMME:

DEVELOPMENT MILESTONES

Announced	Feb 99
Selected by Crossair and Regional Airlines	14 Jun 99
First prototype material cut	14 Jul 00
Rolled out	29 Oct 01
First flight	19 Feb 02
Certification	13 Nov 03
First delivery	8 Mar 04

Announced (officially 'pre-launch') in February 1999; designations then ERJ-170 and ERJ-190; engine selection May 1999; first orders announced 14 June 1999; risk-sharing partners (see 'Structure', below) revealed at European Regional Airline Association annual meeting in Paris, 30 September 1999. Joint definition phase leading to ERJ-170 design



Embraer 175 operated in Canada

1040458



Ecuadorian-registered Embraer 190

1040455



Flybe was first Embraer 195 recipient

1040459

freeze, completed in April 2000; first metal cut for first of six pre-series ERJ-170s 14 July 2000; ERJ-170 (c/n 0001/PP-XJE) first rolled out 29 October 2001, first flight 19 February 2002; followed by c/n 0002/PP-XJC (to be HB-JCA) in Crossair (to become Swiss) colours on 9 April 2002, by which time the first aircraft had completed 40 hours of test flying; c/n 0003/PP-XJB (first equipped with full Honeywell Primus Epic avionics suite) on 25 May 2002; c/n 0004/PP-XJF on 19 June 2002; c/n 0005/PP-XJA on 14 July 2002; and c/n 0006/PP-XJS on 28 December 2002. Announced at roll-out that ERJ prefix was discontinued and that ERJ-190-200 to be known as Embraer 195; intermediate Embraer 175 simultaneously revealed.

Public debut (PP-XJE) at Regional Airline Association convention at Nashville, Tennessee 12 to 15 May 2002, followed by European debut (PP-XJA) at Farnborough International Air Show 22 July 2002, followed by European demonstration tour comprising 18 flights totalling more than 100 hours.

Six flying pre-series aircraft and one production aircraft conducted 3,000 hour flight test programme, culminating in provisional type certification by CTA on 13 November 2003, and by FAA on 8 December 2003, followed by full certification by CTA (19 February 2004), FAA (20 February 2004) and JAA in first quarter 2004 following completion of flight control system certification documentation. Transport Canada certification granted 19 July 2005. First deliveries, to LOT Polish and Alitalia, on 8 and 10 March 2004 respectively. Further two static test airframes (801 and 802) conducted and static fatigue test programme with aim of completing 5,000 simulated flights to clear aircraft for 2,500 actual flight hours by time of certification, and eventual demonstration of 80,000 cycle economic service life. Initial production of four per month in 2003, rising to six per month in 2004 and maximum capacity of 10 per month. 100th E-series, an Embraer 175, delivered to Air Canada 21 October 2005, followed by 200th delivery, an Embraer 190 for Copa Airlines, on 4 December 2006.

CURRENT VERSIONS: **Embraer 170:** Baseline version with 70 to 80 seats; available in Standard and Long-Range versions both FAA-certified (-100 and -100LR) 20 February 2004. Derivatives of LR, with no weight changes are -100SU with 76 seats and -100SE with 70 seats; certified by FAA 14 May and 17 September 2004.

Embraer 175: Longer version with 1.77 m (5 ft 9 3/4 in) fuselage stretch by means of two plugs to accommodate 76 to 80 passengers; offered in Standard and Long-Range versions, designations ERJ-170-200 and -200LR, while -200SU is -200LR version with seating reduced to 76. First flight (c/n 0014-PP-XJD) 14 June 2003, followed by second aircraft on 7 August 2003; Brazilian certification achieved 23 December 2004; Transport Canada certification granted 19 July 2005 followed by US FAA approval for all three versions 31 August 2006.

Embraer 190: Further stretch by 6.34 m (20 ft 9 1/2 in) to accommodate up to 114 passengers; wing span increased by 2.72 m (8 ft 11 in); GE CF34-8E-10E engines; strengthened landing gear; available in Standard, Long-Range and Increased Gross Weight (IGW) versions as 190-100, 100LR and -100IGN versions. Launch customer jetBlue ordered 100, plus 100 options, on 10 June 2003. Prototype rolled out 9 February 2004; first flight 12 March 2004, Brazilian certification granted to all -100 versions 30 August 2005 followed by US FAA approval 2 September 2005 and Transport Canada certification on 6 December 2005.

Embraer 195: Otherwise ERJ-190-200. Further stretch of Embraer 190-100 by 2.41 m (7 ft 11 in) to accommodate up to 118 passengers; available in Standard, Long-Range and IGW versions; first metal cut 23 August 2002; first flight 7 December 2004; Brazilian certification achieved 30 June 2006 following 475 hour flight test programme involving two aircraft. EASA approval granted 17 July 2006; first delivery, to Flybe, on 1 September 2006.

Lineage 1000: Variant of Embraer 190 Long Range. Announced at European Business Aviation Convention & Exhibition at Geneva 3 May 2006. Features include five-zone cabin designed by Priestman Goode accommodating up to 19 passengers with Internet and Wi-Fi access, up to three lavatories and stand-up shower. Cost USD40.95 million (2006). Completions will be undertaken by DeCrane Aircraft Holdings. Cabin volume 115.7 m³ (4,085 cu ft); baggage volume 17.4 m³ (615 cu ft); take-off field length 2,103 m (6,900 ft); range with eight passengers, IFR reserves 4,200 n miles (7,778 km; 4,833 miles). Service entry mid 2008. Two scheduled for delivery in 2008 and up to four in 2009.

CUSTOMERS: Total of 619 orders and 568 options by 30 September 2006, of which 209 then delivered. See table. Launch customers Crossair and Regional Airlines of France announced at Paris Air Show 14 June 1999; Crossair (now Swiss) ordered 30 Embraer 170s and 30 Embraer 195s, with options on a further 100 Embraer 170/195s, for intended delivery (Embraer 170) from December 2002, but subsequently reduced on 25 March 2003 to 15 of each model, with first delivery (Embraer 170) in August 2004 (but see table, below), followed by first Embraer 195 in 2006. North American launch customer US Airways initially ordered 85 Embraer 170s, plus 50 options, on 12 May 2003, for delivery commencing 2004.

EMBRAER 170/190 ORDERS AND DELIVERIES
(at 31 December 2006)

Customer	Variant	Ordered	Del'd	Backlog
AeroRepublic Columbia	190	5	1	4
Air Canada	175	15	15	
	190	45	18	27
Air Caraibes (Guadeloupe)	175	1	1	
	190	1	-	1
Alitalia	170	6	6	
Cirrus	170	2	2	
Copa (Panama)	190	15	6	9
EgyptAir	170	6	-	6
Finnair	170	10	10	
	190	10	1	9
Flybe	195	14	2	12
GECAS	170	9	8	1
	175	5	5	
	190	15	-	15
	195	8	1	7
HNA Group China	190	50	-	50
JetBlue	190	101	23	78
LOT Polish	170	6	6	
	175	4	4	
Northwest	175	36	-	36
Paramount India	170	2	2	
Regional Airlines (France)	190	6	1	5
Republic Airlines	170	48	48	
	175	30	-	30
Royal Jordanian	195	4	-	4
Satena (Colombia)	170	2	2	
Saudi Arabian Airlines	170	15	14	1
Sirte Oil Libya	170	1	-	1
South African Airlink	170	2	-	2
Swiss	170	15	-	15
	190	15	-	15
TAME (Ecuador)	170	2	2	
	190	1	1	
US Airways	170	28	28	
	190	57	2	55
Virgin Blue Pty (Australia)	170	3	-	3
	190	11	-	11
Undisclosed	175	8	-	8
	195	5	-	5
Total		619	209	410

In October 2003 Swiss requested postponement of its firm orders for Embraer 170s and 190s.

COSTS: Embraer 170 USD24.8 million; Embraer 190, USD29.6 million (both 2003). US Airways order for 85 Embraer 170s valued at USD2.1 billion; jetBlue order for 100 Embraer 190s valued at USD3 billion (both 2003). Development USD850 million for whole family (2001).

DESIGN FEATURES: Design goals include low weight, simplicity of operation, common crew type rating, high reliability, ease and economy of maintenance and ability to operate from same airports as ERJ-135/145. Low-wing airliner of conventional appearance, with podded engine below each wing and (on Embraer 170) winglets; airframe designed for an economic life of 60,000 to 80,000 cycles.

FLYING CONTROLS: Fly-by-wire. Ailerons, rudder and all-moving tailplane. Double-slotted flaps, four-section leading-edge slats and five-section spoilers on each wing, of which three outboard panels are multifunctional and inboard pair operate as ground spoilers. Movable horizontal stabiliser for pitch trim. Control surface movements:

170 and 175: Ailerons +25°/-15°, elevator +24° 40'/-14° 40', tailplane +13°/-2°; rudder ±30° 40', ground spoilers 60°, outboard spoilers 40°. Flaps deployable in six stages, max deflections 34° 30' main section and 13° 50' aft section, inboard; and 34° 10' main and 15° 20' aft, outboard flap. Slat angles 20° No. 1 and 25° Nos. 2, 3 and 4.

190 and 195: Ailerons +25°/-15°, elevator +25°/-18°, tailplane +11°/-4°, rudder ±31°/-30° and spoilers as 170/175. Flaps in six stages: 37° 5' and 22° (main and aft), outboard 36° 30' (both). Slats as 170/175.

Ventral airbrake optional to meet steep glideslope requirements for airports such as London City and Lugano.

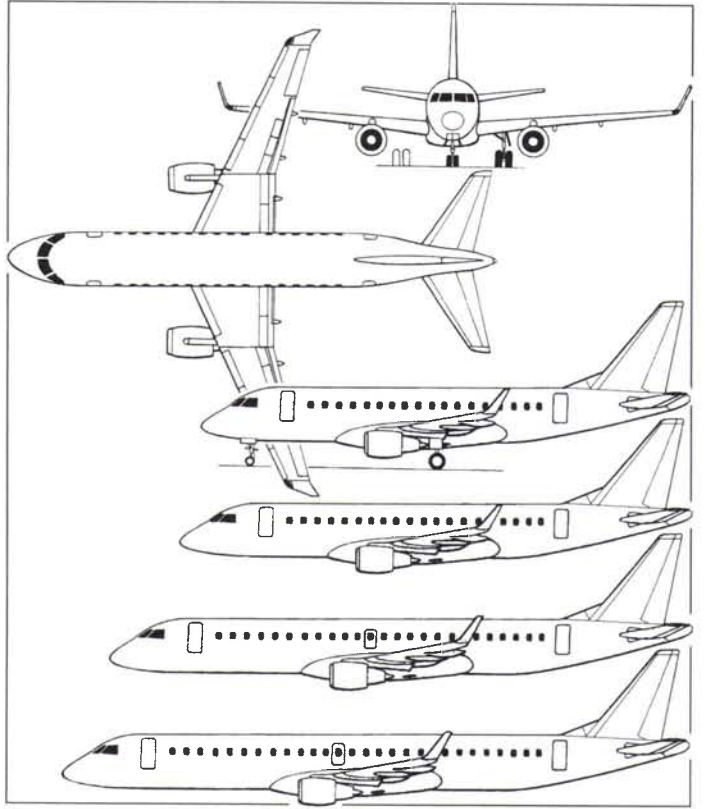
STRUCTURE: Embraer is responsible for, forward fuselage, centre fuselage II, fuselage plugs, wing-to-fuselage fairing and final assembly; risk-sharing partners are C & D Interiors (cabin interior); Gamesa (rear fuselage and horizontal and vertical tail surfaces); General Electric (power plant and nacelles); Hamilton Sundstrand (tailcone, APU and air management and



Embraer 170 regional jet of Hong Kong Express 1040454



Manufactured image of Embraer Lineage 1000 1040456



Embraer 170 regional jet, with additional side views of Embraer 175, Embraer 190 and Embraer 195 (bottom) (James Goulding) 1158973

electrical systems); Honeywell (avionics); Kawasaki (wing stub, fixed leading- and trailing-edge assemblies, flaps, spoilers, control surfaces and engine pylons); Latécoère (centre fuselage I and III); Liebherr (landing gear); Parker Hannifin (hydraulic, flight control and fuel systems); and Sonaca (wing slats).

LANDING GEAR: Twin wheels on each unit. Mainwheels size H38x13.0-18 (18 ply) on Embraer 170/175 and H41x16.0-20 (22 ply) on Embraer 190/195; nosewheels 24x7.7 (12 ply) and 24x7.7 (16 ply), respectively. Aircraft Braking Systems Corporation carbon brakes.

POWER PLANT: Embraer 170/175 series has two 63.2 kN (14,200 lb st) General Electric CF34-8E5 or -8E5A1 turbofans; 190/195 series has two 88.9 kN (20,000 lb st) CF34-10E (optionally -10E6, -10E6A1, -10E5 or -10E5A1) turbofans; both engines have FADEC.

Fuel capacity: 170 and 175: 11,709 litres (3,093 US gallons; 2,576 Imp gallons), of which 11,596 litres (3,063 US gallons; 2,551 Imp gallons) usable, total in two wing tanks. Oil capacity 10 litres (2.6 US gallons; 2.2 Imp gallons) per engine.

190 and 195: 16,266 litres (4,297 US gallons; 3,578 Imp gallons), of which 16,153 litres (4,267 US gallons; 3,553 Imp gallons) usable, total in two wing tanks. Oil capacity 21 litres (5.5 US gallons; 4.6 Imp gallons) per engine.

ACCOMMODATION: Embraer 170: Single Class: 70 at 81 cm (32 in) seat pitch or 78 at 79 cm (31 in) seat pitch; Mixed Class: Eight at 96 cm (38 in) seat pitch and 64 at 79 cm (31 in) seat pitch; Dual Class: six at 91 cm (36 in) seat pitch, three abreast (2+1) and 64 at 79 cm (31 in) seat pitch; High Density 80 at 79 cm (31 in) seat pitch. Doors main (fwd, port), secondary (rear, port), service (two, fwd and aft, Starboard), all functioning as Type I emergency exits; flight deck emergency window exits each side.

Embraer 175: Single Class: 78 at 81 cm (32 in) seat pitch or 86 at 79 cm (31 in) seat pitch; Mixed Class: Eight at 96 cm (38 in) seat pitch and 72 at 79 cm (31 in) seat pitch; Dual Class: six at 91 cm (36 in) seat pitch, three abreast (2+1) and 72 at 79 cm (31 in) seat pitch; High Density 88 at 79 cm (31 in) seat pitch. Doors as Embraer 170.

Embraer 190: Single Class: 98 at 81 cm (32 in) seat pitch or 106 at 79 cm (31 in) seat pitch; Mixed Class: 12 at 91 cm (36 in) seat pitch and 88 at 79 cm (31 in) seat pitch; Dual Class: eight at 96 cm (38 in) seat pitch, three abreast (2+1) and 86 at 79 cm (31 in) seat pitch; High Density 114 at 79 cm (31 in) seat pitch. Doors as Embraer 170, plus Type III emergency exit, centre, each side.

Embraer 195: Single Class: 108 at 81 cm (32 in) seat pitch or 118 at 79 cm (31 in) seat pitch; Mixed Class: 12 at 91 cm (36 in) seat pitch and 100 at 79 cm (31 in) seat pitch; Dual Class: eight at 96 cm (38 in) seat pitch, three abreast (2+1) and 98 at 79 cm (31 in) seat pitch; High Density 122 at 79 cm (31 in) seat pitch. Doors as Embraer 190.

All configurations have forward and aft lavatories; forward and aft galleys; forward and aft flight attendant seats; and forward wardrobes on port side aft of door.

SYSTEMS: Hamilton Sundstrand APS 2300 APU. AVIONICS: Honeywell Primus Epic five-tube EFIS. Thales Avionics integrated electronic standby instrument (IESI) system standard.

DIMENSIONS, EXTERNAL (all versions, except where stated):

Wing span over winglets:	
170, 175	26.00 m (85 ft 3½ in)
190, 195	28.72 m (94 ft 2¾ in)

Wing mean aerodynamic chord: 170, 175	3.195 m (10 ft 5¾ in)
190, 195	3.68 m (12 ft 1 in)
Length overall: 170	29.90 m (98 ft 1¼ in)
175	31.68 m (103 ft 11¼ in)
190	36.24 m (118 ft 10¾ in)
195	38.65 m (126 ft 9½ in)
Height overall: 170	9.85 m (32 ft 4 in)
175	9.73 m (31 ft 11 in)
190	10.28 m (33 ft 8¾ in)
195	10.52 m (34 ft 6 in)
Fuselage height: all	3.35 m (11 ft 0 in)
Fuselage width: all	3.01 m (9 ft 10½ in)
Tailplane span: all	10.00 m (32 ft 9¾ in)
Doors: Main: Height	1.82 m (5 ft 11¾ in)
Width	0.75 m (2 ft 5½ in)
Secondary: Height	1.80 m (5 ft 10¾ in)
Width	0.635 m (2 ft 1 in)
Service, fwd: Height	1.37 m (4 ft 6 in)
Width	0.61 m (2 ft 0 in)
Service, aft: Height	1.38 m (4 ft 6¼ in)
Width	0.63 m (2 ft 0¾ in)
Flight deck emergency exits (two):	
Height	0.51 m (1 ft 8 in)
Width	0.485 m (1 ft 7 in)
Type III emergency (two; 190, 195 only)	
Height	1.03 m (3 ft 4½ in)
Width	0.53 m (1 ft 8¾ in)
DIMENSIONS, INTERNAL:	
Cabin (excl flight deck):	
Length: 170	19.43 m (63 ft 9 in)
175	21.20 m (69 ft 6¾ in)
190	25.76 m (84 ft 6 in)
195	28.17 m (92 ft 5 in)
Max width: all	2.74 m (8 ft 11¾ in)
Max height: all	2.00 m (6 ft 6¾ in)
Aisle width: all	0.50 m (1 ft 7¾ in)
Baggage hold volume:	
forward: 170	8.7 m³ (306 cu ft)
175	10.1 m³ (355 cu ft)
190	12.5 m³ (442 cu ft)
195	13.8 m³ (488 cu ft)
aft: 170	5.8 m³ (204 cu ft)
175	7.2 m³ (254 cu ft)
190	10.1 m³ (358 cu ft)
195	12.7 m³ (448 cu ft)
AREAS:	
Wings, gross: 170, 175	72.72 m² (782.8 sq ft)
190, 195	92.53 m² (996.0 sq ft)
WEIGHTS AND LOADINGS:	
Basic operating weight:	
170	21,140 kg (46,606 lb)
175	21,810 kg (48,083 lb)
190 Standard, Long-Range	28,080 kg (61,906 lb)
190 IGW	28,180 kg (62,126 lb)
195 Standard, Long-Range	28,970 kg (63,868 lb)
195 IGW	29,070 kg (64,088 lb)
Max baggage weight: 170; forward	1,370 kg (3,020 lb)
rear	1,030 kg (2,271 lb)
190; forward	1,850 kg (4,078 lb)
rear	1,650 kg (3,638 lb)
Max payload: 170	9,000 kg (19,842 lb)
175	9,890 kg (21,804 lb)
190	13,530 kg (29,829 lb)
195	12,720 kg (28,043 lb)
Max fuel: 170, 175	9,335 kg (20,580 lb)
190, 195	12,872 kg (28,378 lb)
Max T-O weight:	
170 Standard	35,990 kg (79,344 lb)
170 Long-Range	37,200 kg (82,012 lb)
175 Standard	37,500 kg (82,673 lb)
175 Long-Range	38,790 kg (85,517 lb)
190 Standard	47,790 kg (105,359 lb)
190 Long-Range	50,300 kg (110,892 lb)
190 IGW	51,800 kg (114,199 lb)
195 Standard	48,790 kg (107,563 lb)
195 Long-Range	50,790 kg (111,973 lb)
195 IGW	52,290 kg (115,280 lb)
Max zero-fuel weight:	
170 all	30,140 kg (66,447 lb)
175 all	31,700 kg (69,886 lb)
190 Standard, Long-Range	40,800 kg (89,948 lb)
190 IGW	40,900 kg (90,169 lb)
195 Standard, Long-Range	42,500 kg (93,696 lb)
195 IGW	42,600 kg (93,917 lb)
Max landing weight:	
170, all	32,800 kg (72,311 lb)
175, all	34,000 kg (74,957 lb)
190 Standard, Long-Range	43,000 kg (94,799 lb)
190 IGW	44,000 kg (97,003 lb)
195 Standard, Long-Range	45,000 kg (99,208 lb)
195 IGW	45,800 kg (100,972 lb)
Max wing loading:	
170 Standard	494.9 kg/m² (101.37 lb/sq ft)
170 Long-Range	511.6 kg/m² (104.77 lb/sq ft)
175 Standard	515.7 kg/m² (105.62 lb/sq ft)
175 Long-Range	533.4 kg/m² (109.25 lb/sq ft)
190 Standard	516.5 kg/m² (105.78 lb/sq ft)
190 Long-Range	543.6 kg/m² (111.34 lb/sq ft)
190 IGW	559.8 kg/m² (114.66 lb/sq ft)
195 Standard	527.3 kg/m² (108.00 lb/sq ft)

195 Long-Range	548.9 kg/m² (112.42 lb/sq ft)
195 IGW	565.1 kg/m² (115.74 lb/sq ft)
Max power loading:	
170 Standard	285 kg/kN (2.79 lb/lb st)
170 Long-Range	294 kg/kN (2.89 lb/lb st)
175 Standard	297 kg/kN (2.91 lb/lb st)
175 Long-Range	307 kg/kN (3.01 lb/lb st)
190 Standard	268 kg/kN (2.63 lb/lb st)
190 Long-Range	282 kg/kN (2.77 lb/lb st)
190 IGW	291 kg/kN (2.85 lb/lb st)
195 Standard	274 kg/kN (2.69 lb/lb st)
195 Long-Range	285 kg/kN (2.80 lb/lb st)
195 IGW	294 kg/kN (2.88 lb/lb st)

PERFORMANCE:	
Max operating speed: all	M0.82
Time to FL350:	
170	17 min
175	19 min
190	15 min
195	18 min
Max certified altitude (all):	12,495 m (41,000 ft)
Max runway height: 170, 175	2,440 m (8,000 ft)
190, 195	3,050 m (10,000 ft)
T-O field length:	
170 Long-Range	1,590 m (5,220 ft)
175 Long-Range	1,734 m (5,690 ft)
190 Long-Range	2,107 m (6,915 ft)
195 Long-Range	2,251 m (7,385 ft)
Landing field length:	
170 Long-Range	1,273 m (4,180 ft)
175 Long-Range	1,309 m (4,295 ft)
190 Long-Range	1,392 m (4,570 ft)
195 Long-Range	1,435 m (4,710 ft)
Range with max passengers at long-range cruising speed:	
170 Long-Range	2,000 n miles (3,704 km; 2,301 miles)
175 Long-Range	1,900 n miles (3,518 km; 2,186 miles)
190 IGW	2,300 n miles (4,259 km; 2,646 miles)
195 IGW	2,100 n miles (3,889 km; 2,416 miles)

EMBRAER PHENOM 100

TYPE: Light business jet.

PROGRAMME: Announced, then as Very Light Jet (VLJ), 3 May 2005; BMW Group DesignworksUSA announced as interior designer 6 October 2005; named Phenom 100 and cabin mockup unveiled at the NBAA Convention in Orlando, Florida, 9 November 2005; wind tunnel testing completed by July 2006; first PW615F engine run 29 June 2006; engine first flown on Pratt & Whitney Canada test bed aircraft 16 October 2006; first flight expected in mid-2007; engine certification anticipated fourth quarter 2007; service entry scheduled for mid-2008.

CUSTOMERS: More than 235 firm orders held by 5 September 2006. Announced customers include ABC Taxi Aereo (one), Avantair (20), Eagle Creek Aviation Service (12 plus five options), Gold Aviation Services of Fort Lauderdale, Florida (five, plus 10 options for either Phenom 100s or 300s), JetBrief of Geneva (50, plus 50 options), Magnum Jet of Houston, Texas (50, plus 50 options for either Phenom 100s or 300s), United Aviation (one), and Wondair of Valencia, Spain (24, plus 12 options for either Phenom 100s or 300s).

COSTS: USD2.85 million (2006).

DESIGN FEATURES: Low wing with modest sweepback; T tail; twin, podded, rear-mounted turbofans.

STRUCTURE: Generally of aluminium alloy. Named suppliers include Eaton Corporation (hydraulic power generation package, flap system, landing gear hydraulic components and cockpit controls for throttle, landing gear and flaps) and Pratt & Whitney Canada (engines). Airframe engineered for 35,000 cycles.

LANDING GEAR: Nosewheel type; retractable. Brake-by-wire system with anti-skid.

POWER PLANT: Two Pratt & Whitney Canada PW617T turbofans, with FADEC, each rated at 7.18 kN (1,615 lb st).

ACCOMMODATION: Choice of interior layouts for up to six passengers in 'Oval Light' cabin, designed by BMW Group DesignworksUSA. Typical layouts include six forward-facing seats, or four seats in club arrangement with forward wardrobe or refreshment centre and lavatory at rear. Door on port side, forward of wing. Four cabin windows per side. Cabin is pressurised and air-conditioned.

AVIONICS: 'Prodigy' flight deck with three landscape format flat panel screens, two for PFD and one for MFD functions.

DIMENSIONS, EXTERNAL:

Wing span	12.29 m (40 ft 4 in)
Length overall	12.80 m (42 ft 0 in)
Height overall	4.37 m (14 ft 4 in)
Tailplane span	5.38 m (17 ft 8 in)

DIMENSIONS, INTERNAL:

Cabin: Max width	1.55 m (5 ft 1 in)
Max height	1.50 m (4 ft 11 in)
Baggage compartment volume (total)	1.6 m³ (55 cu ft)

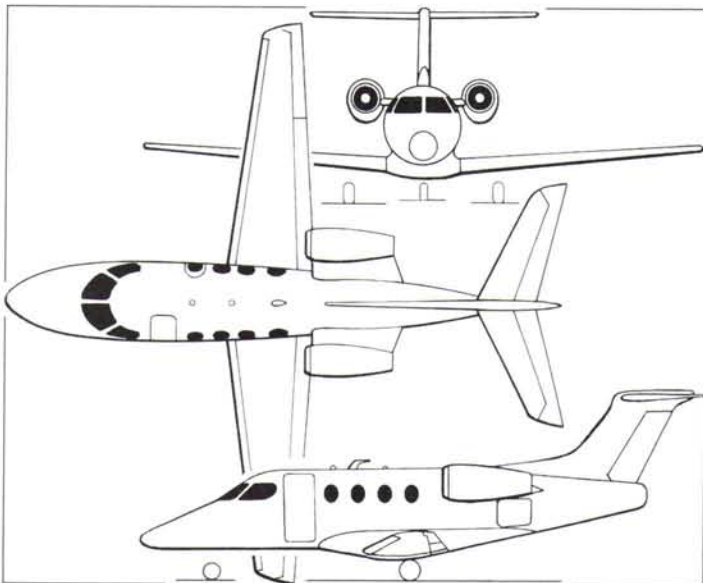
PERFORMANCE (estimated):

Max operating Mach No	0.70
High cruising speed	380 kt (704 km/h; 437 mph)
Max operating altitude	12,495 m (41,000 ft)
T-O field length	1,037 m (3,400 ft)



Manufactured image of Embraer Phenom 100

1040460



Embraer Phenom 100 light business jet (James Goulding)

1154676

Range with four passengers:	
with VFR reserves	1,320 n miles (2,444 km; 1,519 miles)
with NBAA IFR reserves, 100 n mile (185 km; 115 mile alternate)	1,160 n miles (2,148 km; 1,334 miles)

EMBRAER PHENOM 300

TYPE: Business jet.

PROGRAMME: Announced, then as Light Jet (LJ), 3 May 2005; BMW Group DesignworksUSA announced as interior designer 6 October 2005; named Phenom 300 and cabin mockup unveiled at the NBAA Convention in Orlando, Florida, 9 November 2005; service entry scheduled for mid-2009.

CUSTOMERS: Announced customers include Eagle Creek Aviation Services, which ordered four with five options (last named for either Phenom 100s or Phenom 300s) on 18 October 2006, and United Aviation, which ordered one in July 2006.

COSTS: USD6.65 million (2005).

DESIGN FEATURES: Low, sweptback wing with winglets; T tail; twin, podded, rear-mounted turbofans.

STRUCTURE: Generally of aluminium alloy.

LANDING GEAR: Nosewheel type; retractable.

POWER PLANT: Two Pratt & Whitney Canada PW535E turbofans, with FADEC, each rated at 14.23 kN (3,200 lb st).

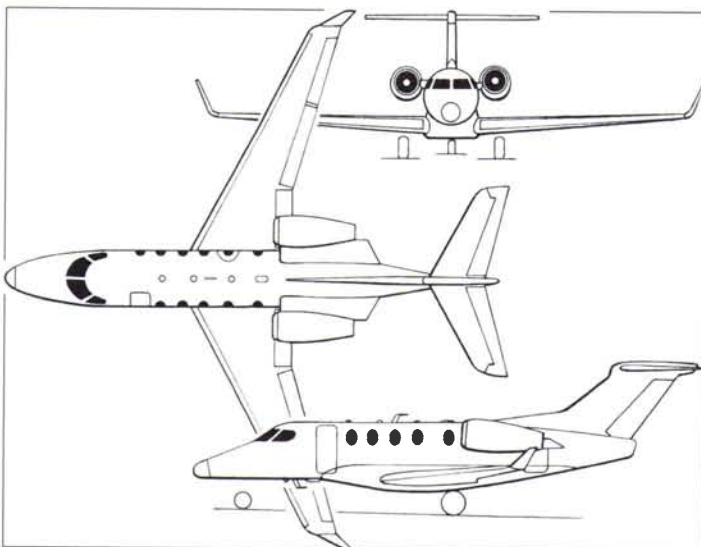
ACCOMMODATION: Choice of interior layouts for up to nine passengers in 'Oval Light' cabin, designed by BMW Group DesignworksUSA. Typical layouts include four seats in club arrangement with single rear-facing seat forward and two forward-facing seats aft, plus lavatory at rear; or four seats in club arrangement with two forward-facing seats and lavatory at rear. Cabin is pressurised and air-conditioned.

AVIONICS: 'Prodigy' flight deck with three landscape format flat panel screens, two for PFD and one for MFD functions.



Artist's impression of Embraer Phenom 300

1040457



Embraer Phenom 300 business jet (James Goulding)

1154674

DIMENSIONS, INTERNAL:

Cabin: Max width	1.55 m (5 ft 1 in)
Max height	41.50 m (4 ft 11 in)
Baggage compartment volume (total):	2.2 m ³ (76 cu ft)
PERFORMANCE (estimated):	
Max operating Mach No	0.78
High cruising speed	450 kt (833 km/h; 518 mph)
Max operating altitude	13,715 m (45,000 ft)
T-O field length	1,128 m (3,700 ft)
Range with six passengers, NBAA IFR reserves, 100 n mile (185 km; 115 mile alternate)	1,800 n miles (3,333 km; 2,071 miles)

EVIAION JETS DO BRASIL**EVIAION JETS DO BRASIL INDUSTRIA AERONAUTICA LTDA**

Estrada Adolfo Bezerra de Menezes, 2457, Torrão de Ouro II, 12229-380 São José dos Campos, SP

Tel: (+55 12) 39 44 40 07

Fax: (+55 12) 39 44 42 03

PRESIDENT: Guido Fontegalant Pessotti

Formed in November 2004 as Eviation Jets do Brasil Engenharia de Aeronaves Ltda. In mid-2005, the company changed its name to Eviation Jets do Brasil Indústria Aeronáutica Ltda to reflect aircraft manufacturing intentions.

Work began in January 2005 to re-engineer Visionaire VA-10 Vantage as Eviation EV-20 Vantage for Eviation Jets at Ames, Iowa, US, involving considerable changes to wing, engine position, fuselage structure and empennage. New configuration frozen mid-2005; currently in detail design phase. EV-20 prototype had been due to fly in mid-2006; certification due late 2007 after 1,200 hours by prototype, plus static test and fatigue airframes. Production aircraft will be built in Brazil in location yet to be defined; marketing by Eviation Jets at Ames.

HELIBRAS**HELICÓPTEROS DO BRASIL SA
(SUBSIDIARY OF EUROCOPTER)**

Distrito Industrial de Itajubá, Rua Santos Dumont 200, CEP, 37504-900 Itajubá, Minas Gerais

Tel: (+55 35) 36 23 20 00

Fax: (+55 35) 36 23 20 01

e-mail: marketing@helibras.com.br

Web: www.helibras.com.br

COMMERCIAL DEPARTMENT:

Aeroporto Campo de Marte, Avenida Santos-Dumont 1979, CEP 02012-010 São Paulo, SP

Tel: (+55 11) 69 90 37 00

Fax: (+55 11) 62 21 55 35

PRESIDENT: Jean-Noël Hardy

COMMERCIAL AND CUSTOMER SUPPORT DIRECTOR: Luiz Eduardo Mauad

MARKETING MANAGER: Julien Négrel

Formed 1978; owned jointly by Grupo Bueninvest (30 per cent), MGI Participações (25 per cent) and Eurocopter France (45 per cent). First assembly hall inaugurated 28 March 1980; facility occupies 12,000 m² (129,200 sq ft); new facilities, totalling 3,800 m² (40,900 sq ft) opened at São Paulo in second quarter of 1998 for maintenance, spares, training, sales and marketing. Total of 250 personnel employed in 2005.

Assembly, marketing and overhaul, under Eurocopter licence, of single- and twin-engined Ecureuil/Fennec helicopters and twin-engined Dauphin/Panther; markets in Brazil and overhauls civil Eurocopter AS 350/355 Esquilo (Fennec), EC 130, EC 135, AS 332 Super Puma; Eurocopter/Kawasaki BK 117C-1 (EC 145); and Eurocopter EC 120.

Total of 500 helicopters, 70 per cent of which are Esquilos, sold by 2006, representing 52 per cent of the turbine-powered helicopter fleet in Brazil; sold to more than 90 customers, including 240 to Brazilian police forces, Army, Navy and Air Force; nearly 10 per cent of overall total exported to Argentina, Bolivia, Chile, Paraguay and Venezuela. Supply of new EC 120B Colibri to local owners began in 1999.

IPE
INDUSTRIA PARANAENSE DE ESTRUTURAS LTDA
Rua Jerônimo Durski 357, Batel, CEP 80440-180
Tel: (+55 41) 32 44 88 32
Fax: (+55 41) 32 42 22 60
e-mail: info@ipeaeronaves.com.br
Web: www.ipeaeronaves.com.br
CEO: João Carlos Boscardin

Formerly a producer of sailplanes, founded by Sen Boscardin (Senior), IPE manufactured the KW-1/KW-2/IPE 05 Quero-Quero (156 built, beginning in 1972) and IPE 02 Nhapecan (80). It also designed the IPE 03 motor glider and IPE 04, a variant of the Mudry CAP 10. The IPE 06 Curucaca tandem-seat lightplane has been re-engineered in composites, while on the drawing board is an agricultural sprayer designated IPE 010.

IPE 06A

TYPE: Two-seat lightplane.
PROGRAMME: IPE 06 Curucaca tandem-seat lightplane first flew in January 1990, built of steel tube with fabric covering, with side-V and half-axle landing gear and powered by a modified 52.2 kW (70 hp) Volkswagen engine. Production totalled 15.
In May 2003, the significantly re-engineered IPE 06A was flown (PP-ZFD), fitted with a more powerful engine and with its airframe translated into composites, resting on spring cantilever main gear. Three production aircraft were under construction in 2004, one assigned to demonstration in North America.
COSTS: USD120,000 (2004).
DESIGN FEATURES: High-mounted, constant-chord wings braced by V struts and intermediate struts; sweptback fin with constant-chord tailplane at base.
FLYING CONTROLS: Conventional and manual. Flaps.
STRUCTURE: Fuselage of 4130 steel with composites skin; composites wing structure with glass fibre skin.
LANDING GEAR: Tailwheel type; fixed. Fuselage-mounted spring cantilever mainwheel legs; steerable tailwheel. Speed fairings on mainwheels. Optional floats.
POWER PLANT: One piston engine; 85.8 kW (115 hp) Textron Lycoming O-235C or 134 kW (180 hp) unspecified motor, according to version. Usable fuel capacity 120 litres (31.7 US gallons; 26.4 Imp gallons).
ACCOMMODATION: Two persons in tandem with longitudinal displacement.
DIMENSIONS, EXTERNAL:
Wing span 10.00 m (32 ft 9¾ in)
Wing chord, constant 1.40 m (4 ft 7 in)
Wing aspect ratio 7.1
Length overall 6.50 m (21 ft 4 in)
AREAS:
Wings, gross 14.00 m² (150.7 sq ft)
WEIGHTS AND LOADINGS (134 kW; 180 hp engine):
Weight empty 580 kg (1,279 lb)
Max T-O weight 950 kg (2,094 lb)
Max wing loading 67.9 kg/m² (13.90 lb/sq ft)
Max power loading 7.08 kg/kW (11.63 lb/hp)
PERFORMANCE:

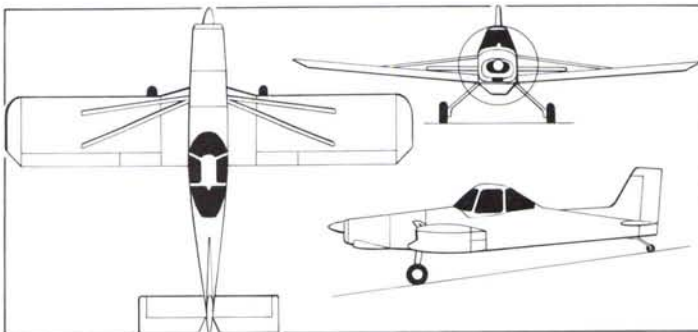
Max level speed 119 kt (220 km/h; 137 mph)
Normal cruising speed 97 kt (180 km/h; 112 mph)
Stalling speed 32 kt (58 km/h; 36 mph)
Max rate of climb at S/L 442 m (1,450 ft)/min
Service ceiling 1,830 m (6,000 ft)
Landing run 50 m (165 ft)
Range 288 n miles (535 km; 332 miles)

IPE 010

TYPE: Agricultural sprayer.
PROGRAMME: Under development by 2004.
DESIGN FEATURES: Conventional crop sprayer configuration with low, constant-chord wing braced by V struts; high cockpit behind hopper, sealed against chemical ingress. Sweptback fin and low-mounted tailplane. STOL performance.
FLYING CONTROLS: Conventional and manual. Flaps.
LANDING GEAR: Tailwheel type; fixed. Fuselage-mounted, spring cantilever mainwheel legs.
POWER PLANT: One 224 kW (300 hp) Textron Lycoming flat-six driving a three-blade propeller. Usable fuel capacity 200 litres (52.8 US gallons; 44.0 Imp gallons).
ACCOMMODATION: Pilot only. High mounted cockpit in line with wing trailing-edge and with all-round transparencies.
EQUIPMENT: Chemical hopper, capacity 1,000 litres (264 US gallons; 220 Imp gallons).
DIMENSIONS, EXTERNAL:
Wing span 10.00 m (32 ft 9¾ in)
Wing chord, constant 1.60 m (5 ft 3 in)
Wing aspect ratio 6.3
Length overall 7.65 m (25 ft 1¼ in)

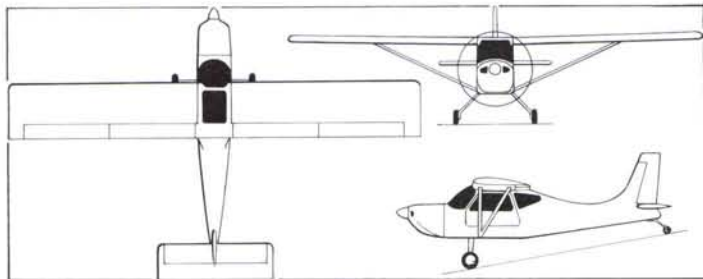


Artist's impression of IPE 010 agricultural sprayer 1151716



IPE 010 project for a Brazilian agricultural sprayer (James Goulding) 1154285

Tailplane span 3.40 m (11 ft 1¾ in)



IPE 06A tandem-seat lightplane (James Goulding) 1154284



Prototype of IPE 06A 1047829

For details of the latest updates to *Jane's All the World's Aircraft* online and to discover the additional information available exclusively to online subscribers please visit jawa.janes.com

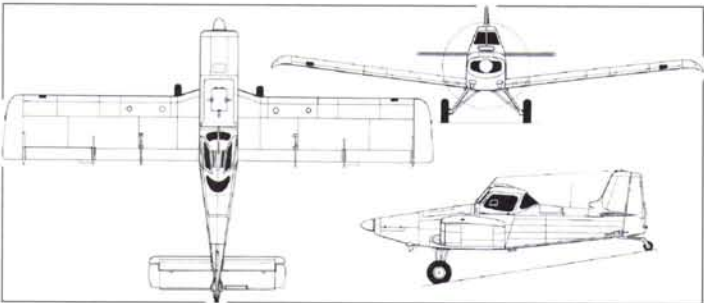
Wheel track	2.65 m (8 ft 8¼ in)
AREAS:	
Wings, gross	16.00 m ² (172.2 sq ft)
WEIGHTS AND LOADINGS:	
Weight empty	800 kg (1,764 lb)
Max T-O weight	2,000 kg (4,409 lb)
Max wing loading	125.0 kg/m ² (25.60 lb/sq ft)
Max power loading	8.94 kg/kW (14.70 lb/hp)

PERFORMANCE:	
Cruising speed at 70% power: at S/L	108 kt (200 km/h; 124 mph)
at FL65	135 kt (250 km/h; 155 mph)
Stalling speed: flaps up	49 kt (90 km/h; 56 mph)
flaps down	38 kt (70 km/h; 44 mph)
T-O run	271 m (890 ft)
Landing run	259 m (850 ft)
Range	356 n miles (660 km; 410 miles)

NEIVA

INDÚSTRIA AERONÁUTICA NEIVA SA
(SUBSIDIARY OF EMBRAER)
Caixa Postal 1011, Avenida Alcides Cagliari 2281, 18606-900 Botucatu-SP
Tel: (+55 14) 38 11 20 46
Fax: (+55 14) 38 11 19 36
e-mail: neiva@laser.com.br
PRESIDENT AND DIRECTOR: Mauricio Novis Botelho
MANAGING DIRECTOR: Paolo Urbanavicius
SALES MANAGERS:
Luiz Fabiano
Zaccarelli Cunha

Formed 12 October 1954 by José Carlos de Barros Neiva; produced Paulistinha, Regente, Universal and related lightplanes of own design. Became wholly owned Embraer subsidiary 11 March 1980; factory area 35,700 m² (384,275 sq ft), workforce 1,324 in October 2004. Previously played major role in Embraer general aviation programmes, including complete production of EMB-711ST Corisco Turbo, EMB-710 Carioca, EMB-720D Minuano (of which some 300 delivered), EMB-721 Sertanejo and EMB-810D Seneca IV (licence-built Piper models); also responsible since 1980 for total production of EMB-202 and now discontinued EMB-201A agricultural sprayers, and for components manufacture for ERJ-145 and Embraer 170/190 programmes. Low-volume production of EMB-120 Brasília was transferred from Embraer in 2001. Total of more than 3,800 aircraft built by 2005, including over 1,000 Ipanemas.



Neiva EMB-202 Ipanema (one Textron Lycoming IO-540) (Dennis Punnett) 0507120

NEIVA EMB-202 IPANEMA

TYPE: Agricultural sprayer.
PROGRAMME: Embraer design; first flight (EMB-200 Ipanema prototype PP-ZIP) 31 July 1970; certified 14 December 1971; see 1977–78 and earlier editions for EMB-200/200A (49/24 built), EMB-201 (200 built) and EMB-201R (three built); and 1992–93 edition for EMB-201A (402 built). Manufacture transferred to Neiva in March 1980; many detail improvements (listed in 1991–92 and earlier *Jane's*) introduced late 1988. Available from 2002 onwards as airframe only, giving option of customer engine installation.
On 10 October 2002, Embraer revealed the prototype (PP-XHQ) of an ethanol-fuelled (Lycoming) Ipanema.
CURRENT VERSIONS: **EMB-202 Ipanema**: Current version from 1992; generally similar to EMB-201A except for larger hopper and choice of Lycoming or Continental engine. First delivery 2 October 1992.
Experimental ethanol-fuelled ('AvAlc') version announced 10 October 2002 as joint development project between Neiva and CTA, with technical support from Textron Lycoming and Hartzell, aimed at reducing emissions and extending engine maintenance cycle; Brazilian CTA certification achieved 19 October 2004.
Prototype was conversion of standard EMB-202 PT-ULA which flew on trials as PP-XHO before reverting to original markings.
CUSTOMERS: Delivery of 900th Ipanema (including 678 of earlier versions) took place on 4 December 2003; 1,000th (PT-UTF) delivered 15 March 2005 was also the first ethanol-fuelled Ipanema for a customer. Sales totalled 29 in 2002, 56 in 2003, and 83 in 2004; total of 63 orders for alcohol fuel conversion held by October 2004. Total 1,008 completed by August 2005; none further by December 2005, although aircraft up to 1,062 reserved.
COSTS: USD245,000; alcohol fuel retrofit USD25,000 (both 2005).
DESIGN FEATURES: Designed to Brazilian Ministry of Agriculture specifications. Typical agricultural aircraft features, including hopper ahead of pilot and high cockpit for good view over nose; low-mounted unbraced wings, with cambered leading-edges (detachable) and tips; rectangular-section fuselage; slightly sweptback vertical tail.
Wing section NACA 23015 (modified); incidence 3°; dihedral 7° from roots.

FLYING CONTROLS: Conventional and manual. Frise ailerons; trim tab in starboard elevator, ground-adjustable tab on rudder. Slotted flaps on wing trailing-edges.
STRUCTURE: All-metal safe-life fuselage frame of welded 4130 steel tube, with removable skin panels of 2024 aluminium alloy and glass fibre and specially treated against chemical corrosion. All-metal wings (single-spar) and tail surfaces (two-spar).
LANDING GEAR: Non-retractable mainwheels and tailwheel, with rubber shock-absorbers in main units. Tailwheel has tapered spring shock-absorber. Mainwheels and tyres size 8.50–10. Tailwheel diameter 250 mm (10 in). Tyre pressures: main, 2.07 to 2.41 bar (30 to 35 lb/sq in); tailwheel, 3.79 bar (55 lb/sq in). Hydraulic disc brakes on mainwheels.
POWER PLANT: One 224 kW (300 hp) Textron Lycoming IO-540-K1J5D flat-six engine, driving a Hartzell three-blade constant-speed metal propeller. Integral fuel tanks in each wing leading-edge, with total capacity of 292 litres (77.1 US gallons; 64.2 Imp gallons), of which 264 litres (69.75 US gallons; 58.1 Imp gallons) are usable. Refuelling point on top of each tank. Oil capacity 12 litres (3.2 US gallons; 2.6 Imp gallons).
ACCOMMODATION: Single horizontally/vertically adjustable seat in fully enclosed cabin with bottom-hinged, dual-lock, jettisonable window/door on each side and two overhead windows. Air conditioning and inertia reel shoulder harness standard.
SYSTEMS: 28 V DC electrical system supplied by 24 Ah batteries and a Bosch KI 28 V 70 A alternator. Power receptacle for external battery (AN-2552-3A type) on port side of forward fuselage.
AVIONICS: *Comms*: Optional portable VHF transceiver.
Flight: Optional portable Garmin GPS.
EQUIPMENT: Hopper for agricultural chemicals, capacity 950 litres (251 US gallons; 209 Imp gallons) liquid or 750 kg (1,653 lb) dry. Dusting system below centre of fuselage. Spraybooms or Micronair atomisers aft of or above wing trailing-edges respectively. Options include ram air pressure generator for use with liquid spray system; improved lightweight spraybooms; smaller/lighter Micronair AU5000 rotary atomisers; Swathmaster spreader.
DIMENSIONS, EXTERNAL:
Wing span 11.69 m (38 ft 4¼ in)
Wing chord, constant 1.71 m (5 ft 7½ in)
Wing aspect ratio 6.9
Length overall (tail up) 7.43 m (24 ft 4½ in)
Height overall (tail down) 2.20 m (7 ft 2½ in)
Fuselage: Max width 0.93 m (3 ft 0½ in)
Tailplane span 3.66 m (12 ft 0 in)
Wheel track 2.20 m (7 ft 2½ in)
Wheelbase 5.20 m (17 ft 7¼ in)
Propeller diameter 2.13 m (7 ft 0 in)



Neiva EMB-202 Ipanema crop srpayer 1151692

DIMENSIONS, INTERNAL:

Cockpit: Length	1.20 m (3 ft 11¼ in)
Max width	0.85 m (2 ft 9½ in)
Max height	1.34 m (4 ft 4¾ in)

AREAS:

Wings, gross	19.94 m ² (214.6 sq ft)
Ailerons (total)	1.60 m ² (17.22 sq ft)
Trailing-edge flaps (total)	2.30 m ² (24.76 sq ft)
Fin	0.58 m ² (6.24 sq ft)
Rudder	0.63 m ² (6.78 sq ft)
Tailplane	3.17 m ² (34.12 sq ft)
Elevators (total, incl tab)	1.50 m ² (16.15 sq ft)

WEIGHTS AND LOADINGS (N: Normal, R: Restricted category):

Weight empty: N, R	1,020 kg (2,249 lb)
Max payload: N, R	750 kg (1,653 lb)
Max T-O and landing weight: N	1,550 kg (3,417 lb)
R	1,800 kg (3,968 lb)
Max wing loading: N	77.7 kg/m ² (15.92 lb/sq ft)
R	90.3 kg/m ² (18.49 lb/sq ft)
Max power loading: N	6.92 kg/kW (11.39 lb/hp)
R	8.03 kg/kW (13.23 lb/hp)

PERFORMANCE (clean):

Never-exceed speed (VNE):	
N	147 kt (272 km/h; 169 mph)
Max level speed at S/L:	
N	124 kt (230 km/h; 143 mph)
R	121 kt (225 km/h; 140 mph)

Max cruising speed at 75% power at FL60:

N	115 kt (213 km/h; 132 mph)
R	111 kt (206 km/h; 128 mph)

Stalling speed, power off (N):

flaps up	56 kt (103 km/h; 64 mph)
8° flap	54 kt (100 km/h; 62 mph)
30° flap	50 kt (92 km/h; 57 mph)

Stalling speed, power off (R):

flaps up	60 kt (110 km/h; 68 mph)
8° flap	58 kt (107 km/h; 66 mph)
30° flap	53 kt (99 km/h; 61 mph)

Max rate of climb at S/L, 8° flap:

N	283 m (930 ft)/min
R	201 m (660 ft)/min
Service ceiling, 8° flap: R	3,470 m (11,380 ft)

T-O run at S/L, asphalt runway:

N	200 m (655 ft)
R	354 m (1,160 ft)

T-O to 15 m (50 ft), conditions as above:

N	332 m (1,090 ft)
R	564 m (1,850 ft)

Landing from 15 m (50 ft) at S/L, 30° flap, asphalt runway: N	412 m (1,355 ft)
R	476 m (1,565 ft)

Landing run, conditions as above: N	153 m (505 ft)
R	170 m (560 ft)

Range at FL60, no reserves:

N	506 n miles (938 km; 583 miles)
R	474 n miles (878 km; 545 miles)

Bulgaria

DAR

DAR SAMOLETI OOD
(DAR AIRCRAFT LTD)

Mladost 103-A-49, Sofia 1797

Tel: (+359) 888 22 64 45

Fax: (+359) 28 70 38 93

e-mail: dar-info@dir.bg

Web: dar.dir.bg

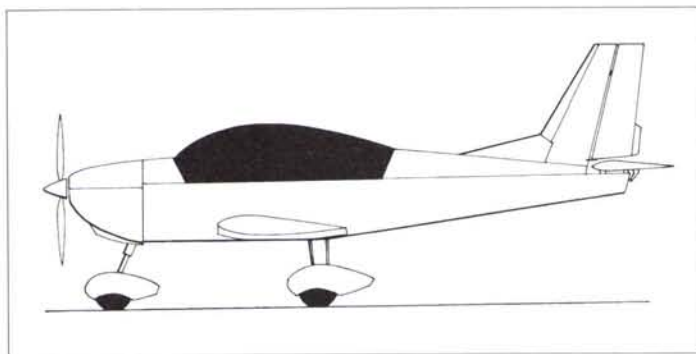
MANAGER AND CO-OWNER: Tony Iliev

CHIEF DESIGNER AND CO-OWNER: Vesselin Valkanov

DAR's product line was expanded with the Impuls in 2003, although the company decided in 2005 to terminate the project because of unspecified "difficulties". Also in 2005, DAR announced it was working on designs called Courier, Speedster and Single, one of which is a low-wing, tricycle lightplane.

Production plants are at Gurmazovo Road, Sofia, and Iskar Industrial zone.

Company name revives initials of former Darjavna Aeroplanna Rabotilnitza (State Aircraft Factory), which produced trainers and a prototype light attack aircraft in late 1930s/early 1940s.



Unnamed aircraft under development by DAR

1151696

DAR-21 VECTOR

TYPE: Tandem-seat ultralight.

PROGRAMME: Designed by Vesselin Valkanov. Prototype (LZ-DAP) first flew 20 May 2000, initially powered by a 39.0 kW (52.3 hp) Hirth 2704. Second aircraft, shown at Blois, France, September 2004, has spring cantilever main landing gear. Agricultural version marketed only in Bulgaria. A nosewheel variant and a DAR-21 Biplane were under development in 2005.

CURRENT VERSIONS: **DAR-21:** Prototype only.

DAR-21S: Production version. Spring cantilever main landing gear permitting carriage of ventral tank for agricultural spraying; larger fin fillet; increased wing span; downturned wingtips; and revised cabin glazing. Displayed at Blois, France, September 2004, prior to first flight.

DAR-21 Tropic: Employs 1050 and 3105 aluminium alloys with improved corrosion resistance. Wing span 8.00 m (26 ft 3 in); wing area 10.40 m² (111.9 sq ft); length 5.75 m (18 ft 10½ in); cockpit width 0.63 m (2 ft 0¾ in); AZUSA brakes and 5.00-5 tyres; 47.8 kW (64.1 hp) Rotax 582 two-stroke; max level speed 76 kt (140 km/h; 87 mph).

COSTS: USD50,000 (agricultural version, 2002).

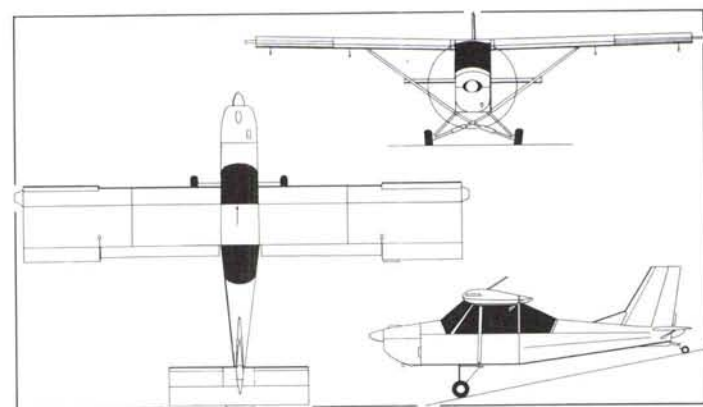
DESIGN FEATURES: Conventional high-wing monoplane of angular appearance; constant-chord wing and tailplane, both strut-braced; sweptback fin; good all-round view from cockpit. Horizontal wingtip vanes and leading-edge slots outboard.

FLYING CONTROLS: Conventional and manual. Flaps (0, 15 and 30°). Trim tabs on starboard aileron and rudder; flight-adjustable (electric) tab on single-piece elevator. Aileron and rudder actuation by cables; elevator by pushrods. No aerodynamic balances.



Prototype DAR-21 Vector with original landing gear

1151705



DAR-21 Vector tandem-seat ultralight (Paul Jackson)

0552994

STRUCTURE: Generally of 2024 and 6061 aluminium alloy sheet, with 4130 steel for welded elements and 4340 steel for milled and turned parts in landing gear. Composites engine cowlings. Single-spar wing.

LANDING GEAR: Tailwheel type; fixed. Prototype fitted with two faired-in side Vs hinged to lower longerons, plus half-axles, each with bungee cord shock-absorber, attached to compression frame. Spring cantilever main legs and wheel fairings on later aircraft. Mainwheel size 6.00 standard; 8.00 optional. Steerable tailwheel. Matco wheels and Grove hydraulic brakes.

POWER PLANT: One piston engine driving a Powerfin F three-blade, composites propeller. Options include 59.7 kW (80 hp) Jabiru 2200; 59.6 kW (79.9 hp) Rotax 912 UL; 59.7 kW (80 hp) Quality Drive 1400; and 68.6 kW (92 hp) Simonini Victor 2. Provision for tank in each wing and fuselage, each 30 litres (7.9 US gallons; 6.6 Imp gallons); normal fuel 60 litres (15.8 US gallons; 13.2 Imp gallons). Standard fit is fuselage tank only.

ACCOMMODATION: Two pilots in tandem in enclosed, extensively glazed cockpit, with single door, starboard, to seats and baggage area to rear. Solo flight from front seat only.

EQUIPMENT: Optional Spray Miser spraying bars mounted at mainwheel leg roots.

DIMENSIONS, EXTERNAL:	
Wing span	9.42 m (30 ft 10¾ in)
Length overall	6.35 m (20 ft 10 in)
Height overall	1.80 m (5 ft 10¾ in)
DIMENSIONS, INTERNAL:	
Cockpit max width	0.68 m (2 ft 2¾ in)
AREAS:	
Wings, gross	12.43 m ² (133.8 sq ft)
WEIGHTS AND LOADINGS (Rotax 912 engine):	
Weight empty	245 kg (540 lb)
Max T-O weight: option 1	450 kg (992 lb)
option 2	495 kg (1,091 lb)
PERFORMANCE (Rotax 912 engine):	
Max level speed	100 kt (185 km/h; 115 mph)
Cruising speed	86 kt (160 km/h; 99 mph)
Stalling speed, flaps down	32 kt (58 km/h; 36 mph)
Max rate of climb at S/L	390 m (1,280 ft)/min
g limits	+4/-2



DAR-23 Aktsent prototype 1121683

English name: Accent	
TYPE: Side-by-side ultralight.	
PROGRAMME: Prototype (LZ-DAS) flying by 2002; joined by second aircraft (LZ-DAF) early 2003. No known production, but promotion continuing in 2005.	
COSTS: Available on application.	
DESIGN FEATURES: Cabin pod underslung from boom carrying uncowed engine, wings and empennage. Wings braced to cabin; cabin braced to boom ahead of windscreen.	
FLYING CONTROLS: Conventional and manual. Plain flaps. Flight adjustable elevator tab. No aerodynamic balances. Ailerons, elevator and flaps actuated by pushrods; rudder by cables.	
STRUCTURE: Metal boom and composites cabin. Metal wings fabric-covered.	
LANDING GEAR: Tricycle type; fixed. Tubular steel legs. Mainwheels Azusa 6.00. Cable mainwheel brakes.	
POWER PLANT: One 34.0 kW (45.6 hp) Rotax 503 U.I. two-stroke driving a Powerfin two blade, composites propeller via 2.58:1 reduction gear. Fuel capacity 30 litres (7.9 US gallons; 6.6 Imp gallons).	
ACCOMMODATION: Optional cover for cockpit.	

DIMENSIONS, EXTERNAL:	
Wing span	8.00 m (26 ft 3 in)
Length overall	5.00 m (16 ft 4¾ in)
Height at wing	1.80 m (5 ft 10¾ in)
DIMENSIONS, INTERNAL:	
Cockpit max width	0.90 m (2 ft 11½ in)
AREAS:	
Wings, gross	10.40 m ² (111.9 sq ft)
WEIGHTS AND LOADINGS:	
Weight empty	180 kg (397 lb)
Max T-O weight	380 kg (837 lb)
PERFORMANCE:	
Max level speed	67 kt (125 km/h; 78 mph)
Max cruising speed	51 kt (95 km/h; 59 mph)
Stalling speed, flaps down	27 kt (50 km/h; 32 mph)
Endurance	3 h
g limits	+4/-2

Canada

21ST CENTURY

21ST CENTURY AIRSHIPS INC
PO Box 177, Main Station, Newmarket, Ontario L3Y 4X1
Tel: (+1 905) 898 62 74
Fax: (+1 905) 898 72 45
e-mail: info@21stcenturyairships.com
Web: www.21stcenturyairships.com
CHAIRMAN AND CEO: Hokan Colting

Formed 1988 as a privately owned R&D company aimed at improving airship technology, and has developed a new type of airship which is spherical and finless. Current airships have an internal cabin for crew and passenger(s); a hybrid Diesel-electric propulsion system with a low noise profile; amphibious ability to land on and take off from water; internal illumination for spectacular visuals during night flights; and a basic design suitable for a variety of tasks. Eight airship prototypes have been built and flown in 11 different configurations, as listed in the accompanying table. They include the SPAS-62.5 which, on 12 June 2003, crewed by Hokan Colting and Tim Buss, set an absolute altitude record of 6,234 m (20,453 ft) in a flight from Drumheller, Alberta, to Gull Lake, Saskatchewan. Since 2004, the basic design has been



SPAS-62.5, one-time holder of absolute world record for altitude 1111647



SPAS-70-B internal cabin, looking rearwards from flight deck 0593265

Model	Reg'n	Seats	Engines (hp)	Diam (ft)	Vol (cu ft)	MTOW (lb)	Remarks
SPAS-1	C-FJHH	1	2 × 24	35	23,000	1,280	First manned spherical prototype; first flight 8 June 1991
SPAS-2	C-FMKK	1	4 × 2.5	33	18,700	1,166	First flight 15 March 1992; later re-engined as SPAS-3
SPAS-3	C-FMKK	1	2 × 5 + 1 × 24	33	18,700	1,166	SPAS-2 with new engine and control configuration; world altitude records in Classes BA-2 to BA-10 on 8 November 1992
SPAS-13	C-FRLM	2	2 × 50	43	41,500	2,400	Semi-rigid with internal frame for structure and engine support; internal flight deck. First flight 10 June 1994
SPAS-13-B	C-FRLM	2	2 × 50	43	41,500	2,400	Re-engineered without internal frame but with internal flight deck
SPAS-70	C-FYOK	2	4 × 100	56	91,000	5,300	Four piston engines; first flight 5 September 1996
SPAS-70-B	C-FYOK	2	2 × 90	56	91,000	5,300	Re-engined with two turbo-diesel engines driving 13 ft diameter propeller; stub wings redesigned. First flight 5 August 1997
SPAS-R1	C-GJKI	4	2 × 90	60	112,000	5,830	First flight 30 June 2002
SPAS-62.5	C-FZRY	2	2 × 80	62.5	126,700	7,480	Absolute world altitude record for airships. 12 June 2003. As of September 2004 (latest information received), was being converted to a hybrid-electric propulsion system with propellers driven by turbo-diesel diesel-generators
SPAS-70-1A	N8041X	2	2 × 80 + 1 × 60	62.5	126,700	7,480	Built for TSI as SA-60. First flight 24 June 2004 with temporary propulsion system. Converted to hybrid-electric propulsion system in September 2004
SPAS-396	C-FAUP	1	2 × 5	30	13,860	825	Used solely for testing a new buoyancy control system for long-duration flights



SPAS-70-B during test flights in 2002

0593258

refined for: (1) a high-altitude platform for telecommunications (cellular phones, microwave and broadband) and national security applications; (2) sightseeing flights; (3) aerial advertising; and (4) heavy lifting.



Hybrid electric propulsion control panel of the SPAS-70-B

0593267

In 2003, manufacturing and sales rights to certain types of 21st Century spherical airship designs were sold to Techsphere Systems International of Atlanta, Georgia, USA (TSI, which see), for whom a SPAS-70-1A was built as a prototype under the new name AeroSphere SA-60.

AIRSTART

AIRSTART CORPORATION

Hangar 11, 11760 109th Street, City Center Airport, Edmonton, Alberta T5G 2T8
Tel: (+1 780) 944 92 10
Fax: (+1 780) 461 05 84
e-mail: griffin@airstart.com
Web: www.airstart.com
POSTAL ADDRESS: 11760 109th Street, Edmonton, Alberta T5G 2T8
CEO: Ron Wunder
VICE-PRESIDENT, SALES AND MARKETING: William (Bill) Crampton

Following refinancing, the former Canada Air RV company was reorganised. Manufacturing is now undertaken by AC Millennium Corporation, and Sales and Marketing by AirStart Corporation. Research and development is undertaken by ARV Development Corporation. The Griffin is at present available only in North America; research and development continues under the aegis of ARV Development Corporation; no recent information received.

AIRSTART GRIFFIN

TYPE: Side-by-side kitbuilt.
PROGRAMME: Design work started January 1989; construction of first prototype Griffin I began September 1989; first flight 1993. Construction of Mark II began 1995 with first flight that year; Mark III first flown 1997 followed by Mark IV first flight October 1998. First kit delivered 4 January 1996.
CURRENT VERSIONS: **Griffin III**: Lower-powered version; no longer available.



Airstart Griffin IV

1042704

Griffin IV: Baseline version, as described.

CUSTOMERS: Total of 72 ordered and nine flying by end 2004 including four in Canada and two in USA (latest information received).

COSTS: Kit CAD28,900 excluding engine, propeller and instruments (2005). Estimated design/programme cost USD3.5 million to date.

DESIGN FEATURES: High-wing monoplane. Good all-round visibility, including roof windows, enhanced by instrument panel positioned low in cockpit and convex side windows. Quoted build time 800 hours.

FLYING CONTROLS: Manual. Full-span continuously positionable flaperons deflect to 20° and also reflex slightly for cruise drag reduction. Electrically operated full-span trim on port elevator.

STRUCTURE: All-aluminium semi-monocoque fuselage and wings; elevator and rudder are fabric-covered. Single-strut laminar flow high-aspect ratio wing; thickness/chord ratio 19 per cent. Wing dihedral 1° 30'. Low-mounted tailplane.

LANDING GEAR: Choice of fixed tricycle or tailwheel layout. Fuselage-mounted spring aluminium cantilever mainwheel legs. Tricycle version has oleo-pneumatic nosewheel suspension. Tailwheel version has steerable Matco 11 cm (4½ in) tailwheel. Matco disc brakes. Mainwheels and nosewheel Matco 6.00–6, all tyres pressurised to 2.9 bar (42 lb/sq in).

POWER PLANT: *Griffin IV*: One 119 kW (160 hp) Textron Lycoming O-320 flat-four engine, driving a two-blade fixed-pitch wooden propeller in demonstrator; engines in range 74.6 to 119 kW (100 to 160 hp) can be fitted including 59.6 kW (79.9 hp) Rotax 912 and 74.6 kW (100 hp) Teledyne Continental O-200A.

Griffin III: 74.6 kW (100 hp) CAM 100 piston engine.

Fuel capacity 136 litres (35.9 US gallons; 29.9 Imp gallons) in two wing tanks. Oil capacity 8 litres (2.1 US gallons; 1.8 Imp gallons).

ACCOMMODATION: Pilot and passenger in side-by-side seating with dual controls. Upward-opening door on each side of fuselage. Baggage stowage behind seats.

DIMENSIONS, EXTERNAL:

Wing span	10.82 m (35 ft 6 in)
Wing chord: at root	1.23 m (4 ft 0½ in)
at tip	0.74 m (2 ft 5 in)
Wing aspect ratio	11.0
Length overall	6.25 m (20 ft 6 in)
Fuselage max width	1.09 m (3 ft 7 in)
Height overall: tricycle	2.44 m (8 ft 0 in)
Tailplane span	2.54 m (8 ft 4 in)
Wheel track	2.44 m (8 ft 0 in)
Wheelbase: tricycle	2.44 m (8 ft 0 in)
Propeller diameter	1.83 m (6 ft 0 in)
Propeller ground clearance: tricycle	0.26 m (10¼ in)
Passenger doors (each): Height	0.76 m (2 ft 6 in)
Width	0.76 m (2 ft 6 in)

DIMENSIONS, INTERNAL:	
Cabin: Length	1.07 m (3 ft 6 in)
Max width	1.09 m (3 ft 7 in)
Max height	1.07 m (3 ft 6 in)
Floor area	1.28 m ² (13.8 sq ft)
Baggage hold volume	0.51 m ³ (18.0 cu ft)
AREAS:	
Wings, gross	10.68 m ² (115.0 sq ft)
Rudder	0.55 m ² (5.90 sq ft)
Tailplane	1.89 m ² (20.34 sq ft)
Elevator	1.01 m ² (10.87 sq ft)
WEIGHTS AND LOADINGS (with 119 kW, 160 hp engine):	
Weight empty	490 kg (1,080 lb)
Baggage capacity	91 kg (200 lb)
Max T-O and landing weight:	
Griffin IV	785 kg (1,731 lb)
Max zero-fuel weight	682 kg (1,503 lb)

Max wing loading	73.7 kg/m ² (15.09 lb/sq ft)
Max power loading	6.60 kg/kW (10.84 lb/hp)
PERFORMANCE (with 119 kW, 160 hp engine):	
Never-exceed speed (VNE):	
Griffin IV	144 kt (266 km/h; 165 mph)
Max operating speed (VMO):	
Griffin IV	141 kt (261 km/h; 162 mph)
Max cruising speed at 75% power:	
Griffin IV	130 kt (241 km/h; 150 mph)
Econ cruising speed	114 kt (211 km/h; 131 mph)
Stalling speed	40 kt (73 km/h; 45 mph)
Max rate of climb at S/L	396 m (1,300 ft)/min
Service ceiling	5,485 m (18,000 ft)
T-O run	107 m (350 ft)
Landing run	183 m (600 ft)
Range with max fuel	565 n miles (1,046 km; 650 miles)

BELL

BELL HELICOPTER TEXTRON CANADA
(DIVISION OF TEXTRON CANADA LTD)
12800 Rue de l'Avenir, Mirabel, Québec J7J 1R4
Tel: (+1 514) 437 34 00
Fax: (+1 514) 437 60 10
e-mail: bhtchr@bellhelicopter.textron.com
PRESIDENT: Paul Costanzo

Memorandum of Understanding to start helicopter industry in Canada signed 7 October 1983; 38,900 m² (418,725 sq ft) factory opened late 1985 and employs 1,700 people; US civil production of 206B JetRanger transferred to Canada in 1986, 206L LongRanger by early 1987; then 212 in 1988 and 412 in 1989. The 230 was introduced and certified in Canada in 1992, but has been replaced by the 430. Newest products are the 407 and 427. About half of each helicopter made in Canada (dynamic systems supplied by Bell Fort Worth). Total of 233 commercial helicopters delivered in 1997, followed by 197 in 1998, 146 in 1999, 145 in 2000, 122 in 2001, 92 in 2002, 97 in 2003, and 109 in 2004. Deliveries in 2005 were 105 commercial and 18 military, not including 19 Bell Boeing V-22 Ospreys.

BELL 206B-3 JETRANGER III

US Army designation: TH-67 Creek

TYPE: Light utility helicopter.

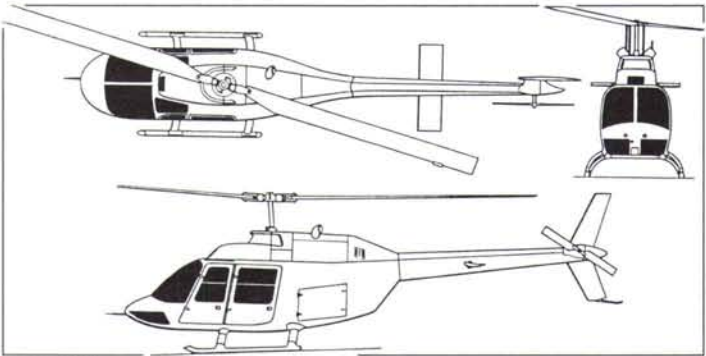
PROGRAMME: Model 206 first flew (N73999) 8 December 1962 and unsuccessfully offered to US Army as four-seat OH-4 with Allison 250-C10 turboshaft and 1,134 kg (2,500 lb) MTOW; certified by FAA on 28 April 1964, but only five YOH-4As built. Redesignated as five-seat Model 206A Jet Ranger, with 236 kW (317 hp) Allison 250-C18 engine and 3,000 lb MTOW; first flown (N8560F) 10 January 1966; certified 20 October 1966. Model 206A-1, with longer main blades and re-shaped rear windows, certified 6 May 1969 and built as OH-58A/B Kiowa (of which several civilised under former designation) and TH-57A Sea Ranger.

Model 206B Jet Ranger II certified 19 August 1971, with 236 kW (317 hp) Allison 250-C20 engine and 3,200 lb MTOW (some 206As retrofitted); Model 206B-1 certified 10 November 1971 but produced only for Australia; Model 206B-2 introduced 1976 and 206B-3 in mid-1977, latter with Allison (later Rolls Royce) 250-C20J power plant which originally certified for Bell 206L; also built for US Navy as TH-57B/C. Production transferred from Fort Worth, Texas, to Mirabel, Canada, in 1986, beginning with c/n 3959. Increase of 68 kg (150 lb) in payload announced in January 2004.

CURRENT VERSIONS: 206B-3 JetRanger III: Current civil production version.

Following description refers to JetRanger III.

TH-67 Creek (Bell designation TH-206): Selected March 1993 as US Army NTH (New Training Helicopter) choice to replace UH-1 at pilot training school, Fort Rucker, Alabama (223 Aviation Regiment at Cairns AAF and 212 Aviation Regiment at Lowe AHP). Instructor and pupil in front seats; plans abandoned for second pupil to be seated at the rear, observing flight instruments by closed-circuit TV screen mounted on back of right-hand



Bell 206B-3 JetRanger five-seat helicopter (Paul Jackson)

0507574

front seat. Powered by Rolls-Royce (formerly Allison) 250-C20JN engine. First batch included nine cockpit procedures trainers outfitted by Frasca International; three configurations: VFR, IFR, and VFR with IFR provision.

TH 67 features also include dual controls, crashworthy seats, five-point seat restraints, heavy-duty battery, particle separator, bleed air heater, heavy-duty skid shoes and enlarged instrument panel. IFR version additionally possesses force trim system, auxiliary electrical system and is FAA certified for dual pilot operation. Also supplied to Taiwan Army, based at Gwe-Ren.

CUSTOMERS: TH-206 (TH-67 Creek) declared winner of US Army NTH competition March 1993; initial 102 ordered in IFR configuration; second batch of 35 VFR helicopters ordered February 1994; deliveries began 15 October 1993 with N67001 and N67014 (all TH-67s have civilian registrations); 45 aircraft (and six procedures trainers) delivered in time for first training course to open 5 May 1994; initial orders 137 TH-67s and nine cockpit procedures trainers; all delivered by late 1995. Additional orders placed on behalf of Taiwanese Army, which received 30 TH-67s in 1997-99. Deliveries in 1999 included six to the Bulgarian Air Force. Further 50 ordered for US Army for delivery between September 2001 and November 2003. Recent customers include Fort Worth Police Air Support Division of Texas, which took delivery of one at Heli-Expo 2004 in Las Vegas in March 2004, replacing an earlier JetRanger.

Production of Model 206 (not including four-blade Model 406s) up to January 2006 has comprised five YOH-4As, 713 Model 206As, 2,202 Model 206A-1/OH-58s, 74 Canadian CH-136/OH-58As, 56 Australian CA-32/OH-58As, 40 TH-57As, 50 OH-58Bs, 217 TH-67As, 1,177 Model 206Bs, 321 Model 206B-2s and some 2,384 Model 206B-3s, while further 911 Jet Rangers built by Agusta in Italy. Total 8,150. Bell Canada delivered 28 206Bs in 1999; 14 in both 2000 and 2001; 20 in 2002 (including 10 TH-67s), 30 in 2003 (including 20 TH-67s), eight in 2004 (including one TH-67) and 16 (10 civil, six military) in 2005.



Bell 206B-3 JetRanger III (Paul Jackson)

1151691

COSTS: US Army initial NTH contract USD84.9 million. Average direct operating cost USD221.47 per hour (2004).

DESIGN FEATURES: Typical light utility helicopter with skid landing gear, high-mounted tailboom and horizontal stabiliser. Two-blade teetering main rotor with precone and underslung bearings; blades retained by grip, pitch change bearing and torsion-tension strap assembly; two-blade tail rotor driven via 2.3:1 reduction gearbox; main rotor rpm 374 to 394.

FLYING CONTROLS: Hydraulic fully powered cyclic and collective controls and foot-powered tail rotor control; tailplane with highly cambered inverted aerofoil section and stall strip produces appropriate nose-up and nose-down attitude during climb and descent; optional autostabiliser, autopilot and IFR systems.

STRUCTURE: Conventional light alloy structure with two floor beams and bonded honeycomb sandwich floor; transmission mounted on two beams and deck joined to floor by three fuselage frames; main rotor blades have extruded aluminium D-section leading-edge with honeycomb core behind, covered by bonded skin; tail rotor blades have bonded skin without honeycomb core.

LANDING GEAR: Aluminium alloy tubular skids bolted to extruded cross-tubes. Tubular steel skid on ventral fin to protect tail rotor in tail-down landing. Ground handling wheels optional. Special high skid gear (0.25 m; 10 in greater ground clearance) available for use in areas with high brush. Pontoons or lightweight pop-out floats, available as optional kits.

POWER PLANT: One Rolls-Royce 250-C20J turboshaft, rated at 313 kW (420 shp) for T-O; 276 kW (370 shp) max continuous. Optionally, one Rolls-Royce 250-C20R/4 rated at 336 kW (450 shp) for T-O. Transmission rating 236 kW (317 shp) for T-O; 201 kW (270 shp) continuous. Rupture-resistant fuel tank below and behind rear passenger seat, usable capacity 344 litres (91.0 US gallons; 75.75 Imp gallons). Refuelling point on starboard side of fuselage, aft of cabin. Oil capacity 5.68 litres (1.5 US gallons; 1.25 Imp gallons).

ACCOMMODATION: Two seats side by side in front and rear bench comprising three equal-width seats. Corporate interior optional. Dual controls optional. Two forward-hinged doors on each side, made of formed aluminium alloy with transparent panels (bulged on rear pair). Baggage compartment aft of rear seats, capacity 113 kg (250 lb), with external door on port side.

SYSTEMS: Hydraulic system, pressure 41.5 bar (600 lb/sq in), for cyclic, collective and directional controls. Maximum flow rate 7.57 litres (2.0 US gallons; 1.65 Imp gallons)/min. Open reservoir. Electrical supply from 150 A starter/generator. One 28 V 17 Ah Ni/Cd battery; auxiliary 13 Ah battery optional. Optional ECS.

AVIONICS: Optional Bendix/King VHF communications, transponder, intercom and speaker system.

Flight: VOR, ADF, DME and R/Nav optional.

EQUIPMENT: Standard equipment includes cabin fire extinguisher, first aid kit, door locks, night lighting, and dynamic flapping restraints. Optional items include clock, engine hour meter, turn and slip indicator, custom seating, soundproofing, internal stretcher kit, rescue hoist, cabin heater, snow baffle, camera access door, high-intensity night lights, SX-16C NightSun searchlight, engine fire detection system, wire-strike protection kit and external cargo hook of 680 kg (1,500 lb) capacity.

DIMENSIONS, EXTERNAL:

Main rotor diameter	10.16 m (33 ft 4 in)
Main rotor blade chord	0.33 m (1 ft 1 in)
Tail rotor diameter	1.65 m (5 ft 5 in)
Tail rotor blade chord	0.12 m (4¾ in)
Distance between rotor centres	5.96 m (19 ft 6½ in)
Length: overall, rotors turning	11.96 m (39 ft 2¾ in)
fuselage, incl tailskid	9.89 m (32 ft 5¼ in)
Height: over tailfin	2.54 m (8 ft 4 in)
to top of rotor head:	
standard skids	2.89 m (9 ft 6 in)
high skids	3.17 m (10 ft 4¾ in)
emergency floats	3.20 m (10 ft 6 in)
Stabiliser: span	1.97 m (6 ft 5¾ in)
chord	0.46 m (1 ft 6 in)
Width over landing gear:	
standard skids	1.92 m (6 ft 3½ in)
high skids	2.07 m (6 ft 9½ in)
emergency floats	2.68 m (8 ft 9½ in)
Fuselage ground clearance:	
standard skids	0.30 m (1 ft 0 in)
high skids	0.58 m (1 ft 10¾ in)
emergency floats	0.64 m (2 ft 1¼ in)
Forward cabin doors (each): Height	1.02 m (3 ft 4 in)
Width	0.61 m (2 ft 0 in)
Rear cabin doors (each): Height	1.02 m (3 ft 4 in)
Width	0.91 m (3 ft 0 in)

DIMENSIONS, INTERNAL:

Cabin: Length of seating area	2.13 m (7 ft 0 in)
Max width	1.27 m (4 ft 2 in)
Max height	1.28 m (4 ft 3 in)
Volume	1.1 m ³ (40 cu ft)
Baggage compartment:	
Max width	1.10 m (3 ft 7¼ in)
Max height	0.55 m (1 ft 9½ in)
Max length	0.94 m (3 ft 1¼ in)
Volume	approx 0.45 m ³ (16 cu ft)

AREAS:

Main rotor blades (each)	1.68 m ² (18.05 sq ft)
Tail rotor blades (each)	0.11 m ² (1.18 sq ft)
Main rotor disc	81.07 m ² (872.7 sq ft)
Tail rotor disc	2.14 m ² (23.05 sq ft)
Stabiliser	0.90 m ² (9.65 sq ft)

WEIGHTS AND LOADINGS:

Weight empty: standard civil	777 kg (1,713 lb)
TH-67: VFR	852 kg (1,879 lb)
IFR	911 kg (2,009 lb)
Operating weight, TH-67: VFR	1,369 kg (3,019 lb)
IFR	1,428 kg (3,149 lb)
Max payload: internal	676 kg (1,490 lb)
external	680 kg (1,500 lb)
Max T-O weight: internal load, standard	1,451 kg (3,200 lb)
internal load optional and external load	1,519 kg (3,350 lb)
Max disc loading:	
internal load	17.9 kg/m ² (3.67 lb/sq ft)
external load	18.7 kg/m ² (3.84 lb/sq ft)

Transmission loading at max T-O weight and power:

internal load	6.15 kg/kW (10.09 lb/shp)
external load	6.43 kg/kW (10.57 lb/shp)

PERFORMANCE (at internal load max T-O weight, ISA):

Never-exceed speed (VNE) at S/L	122 kt (225 km/h; 140 mph)
Max and econ cruising speed at S/L	115 kt (214 km/h; 133 mph)
Max rate of climb at S/L	411 m (1,350 ft)/min
Vertical rate of climb at S/L	91 m (300 ft)/min
Service ceiling	4,115 m (13,500 ft)
Hovering ceiling: IGE	4,025 m (13,200 ft)
OGE	1,615 m (5,300 ft)
Range with max fuel, no reserves:	
at S/L	374 n miles (692 km; 430 miles)
at FL50	395 n miles (732 km; 455 miles)
Range, max fuel, long-range cruising speed	374 n miles (692 km; 430 miles)
Endurance	4 h 30 min

OPERATIONAL NOISE LEVELS (FAR Pt 36):

T-O	88.7 EPNdB
Flyover	85.4 EPNdB
Approach	90.6 EPNdB

BELL 206L-4 LONGRANGER IV

TYPE: Light utility helicopter.

PROGRAMME: Stretched JetRanger. LongRanger announced 25 September 1973; first flight (N206L) 11 September 1974; initial versions were 206L (certified 22 September 1975, 1,814 kg; 4,000 lb MTOW) and 206L-1 LongRanger II (certified 17 May 1978, 1,837 kg; 4,050 lb (internal) MTOW); plus limited production of 206L-2 (derated 186 kW; 250 shp engine). Model 206L-3 LongRanger III certified 10 December 1981 with -C30P engine derated to 324 kW (435 shp) and 1,882 kg (4,150 lb) MTOW. Production having transferred to Canada in January 1987.

CURRENT VERSIONS: **LongRanger IV:** Announced March 1992 as new current standard model; transmission updated to absorb 365 kW (490 shp) instead of 324 kW (435 shp) from same engine; gross weight raised from 1,882 kg (4,150 lb) to 2,018 kg (4,450 lb); certified 2 October 1992 and delivered from December that year.

TwinRanger: Twin-engined version; model **206LT**; 13 built on LongRanger IV line between 1993 and 1997. No longer available.

Gemini ST: Twin-engined rebuild of LongRanger III/IV developed by Tridair and Soloy in USA; see *Jane's Aircraft Upgrades*.

CUSTOMERS: Production up to early 2006 totalled 153 Model 206Ls, 637 Model 206L-1s, 17 Model 206L-2s, 612 Model 206L-3s (final 398 at Mirabel) and 321 Model 206L-4s (and LTs) or 1,740 in all. Total of 12 delivered in 1999, 27 in 2000, 10 in 2001, 12 in 2002, six in 2003, 18 in 2004 and 22 in 2005. Recent customers include Rotorcraft Leasing LLC of Louisiana, which ordered six in February 2005 for delivery in the third and fourth quarters of 2005.

COSTS: Average direct operating cost USD280.47 per hour (2004).

DESIGN FEATURES: As JetRanger, but cabin length increased to make room for club seating and extra window; Bell Noda-Matic transmission to reduce vibration; vertical stabilisers added to horizontal tail surfaces. Improvements introduced on LongRanger II include new freewheel unit, modified shafting and increased-thrust tail rotor; main rotor rpm 394; rotor brake optional.

FLYING CONTROLS: As JetRanger, but with endplate fins on tailplane; single-pilot IFR with Rockwell Collins AP-107H autopilot; optional SFENA autopilot with stabilisation and holds for heading, height and approach.

STRUCTURE: As JetRanger.

LANDING GEAR: As JetRanger.

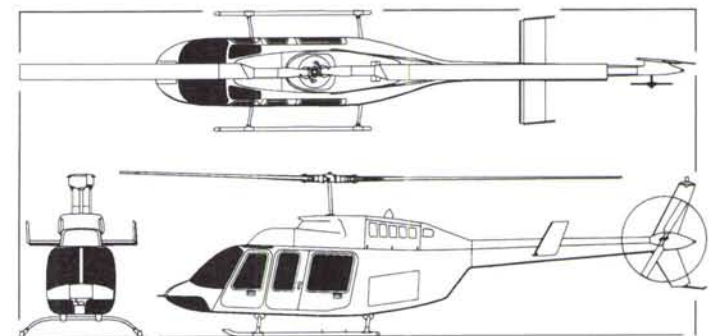
POWER PLANT: One 541 kW (726 shp) Rolls-Royce 250-C30P turboshaft (maximum continuous rating 470 kW; 630 shp). Transmission rated at 365 kW (490 shp) for take-off, with a continuous rating of 276 kW (370 shp); 340 kW (456 shp) transmission optional. Rupture-resistant fuel system, comprising three interconnected cells, total usable capacity 419 litres (111 US gallons; 92.0 Imp gallons).

ACCOMMODATION: Redesigned rear cabin, more spacious than JetRanger. With a crew of two, standard cabin layout accommodates five passengers in two canted rearward-facing seats



Bell 206L LongRanger (Paul Jackson)

1151690



Bell 206L-4 LongRanger IV general purpose light helicopter (Paul Jackson)

1151699

and three forward-facing seats. Optional DeLuxe and Custom DeLuxe interiors with fabric, fabric/vinyl, all vinyl or fabric/leather seats. Port forward passenger seat has folding back to allow loading of a 2.44 × 0.91 × 0.30 m (8 × 3 × 1 ft) container, making possible carriage of such items as survey equipment, skis and other long components. Double doors on port side of cabin provide opening 1.55 m (5 ft 1 in) wide, for straight-in loading of stretcher patients or utility cargo; in ambulance or rescue role two stretcher patients and two ambulatory patients/attendants can be carried. Dual controls optional.

SYSTEMS: Hydraulic system: 28 V DC electrical power from 180 A starter/generator and 17 Ah battery. Engine bleed air ECS optional.

AVIONICS: Comms: Bendix/King suite includes dual nav/com and transponder.
Flight: ADF, DME and marker beacon receiver. Honeywell R/Nav, radio altimeter and encoding altimeter optional.

EQUIPMENT: Optional kits include emergency flotation gear, 907 kg (2,000 lb) cargo hook, rescue hoist, NightSun searchlight (requires high skid gear).

DIMENSIONS, EXTERNAL:

Main rotor diameter	11.28 m (37 ft 0 in)
Main rotor blade chord	0.33 m (1 ft 1 in)
Tail rotor diameter	1.65 m (5 ft 5 in)
Tail rotor blade chord	0.135 m (5¼ in)
Length: overall, rotors turning	12.92 m (42 ft 4¾ in)
fuselage, incl tailskid	10.55 m (34 ft 7¼ in)
Height: over tailfin	3.05 m (10 ft 0 in)
to top of rotor head	3.14 m (10 ft 3¾ in)
Fuselage: Max width	1.32 m (4 ft 4 in)
Stabiliser span	1.98 m (6 ft 6 in)
Width over skids, under load	2.34 m (7 ft 8 in)
Forward cabin doors (each): Height	1.04 m (3 ft 5 in)
Max width	0.61 m (2 ft 0 in)
Centre cabin door (port): Height	1.04 m (3 ft 5 in)
Width	0.64 m (2 ft 1¼ in)
Rear cabin doors (each): Height	1.04 m (3 ft 5 in)
Width	0.91 m (3 ft 0 in)
Baggage door: Height	0.55 m (1 ft 9½ in)
Width	0.94 m (3 ft 1¼ in)

DIMENSIONS, INTERNAL:

Cabin: Length	2.74 m (9 ft 0 in)
Max width and height	as JetRanger
Volume	2.4 m³ (83 cu ft)
Cabin cargo volume (all passenger seats removed)	2.83 m³ (100 cu ft)
Baggage compartment volume	0.45 m³ (16.0 cu ft)

AREAS:

Main rotor disc	99.89 m² (1,075.2 sq ft)
Tail rotor disc	2.13 m² (22.97 sq ft)

WEIGHTS AND LOADINGS:

Weight empty, standard	1,056 kg (2,327 lb)
useful load, standard	963 kg (2,123 lb)
Max external load	907 kg (2,000 lb)
Max T-O weight: normal	2,018 kg (4,450 lb)
external load	2,064 kg (4,550 lb)
Max disc loading: normal	20.7 kg/m² (4.23 lb/sq ft)
external load	19.3 kg/m² (3.95 lb/sq ft)
Transmission loading at max T-O weight and power:	
internal load	5.52 kg/kW (9.08 lb/shp)
external load	5.65 kg/kW (9.29 lb/shp)

PERFORMANCE (at max normal T-O weight, ISA):

Never-exceed speed (VNE):	
at S/L	130 kt (241 km/h; 150 mph)
at FL50	133 kt (246 km/h; 153 mph)
Max cruising speed: at S/L	110 kt (204 km/h; 127 mph)
at FL50	111 kt (206 km/h; 128 mph)
Max rate of climb at S/L	408 m (1,340 ft)/min
Service ceiling at max cruise power	3,050 m (10,000 ft)
Hovering ceiling: IGE	3,050 m (10,000 ft)
OGE	1,980 m (6,500 ft)
Range with max fuel, no reserves:	
at S/L	324 n miles (600 km; 372 miles)
at FL50	357 n miles (661 km; 411 miles)
Endurance	3 h 42 min

OPERATIONAL NOISE LEVELS (FAR Pt 36):

T-O	88.4 EPNdB
Flyover	85.2 EPNdB
Approach	90.7 EPNdB

BELL 407

TYPE: Light utility helicopter.
PROGRAMME: Design definition launched in 1993 as Bell Light Helicopter to supplement, and eventually replace, JetRanger and LongRanger; concept demonstrator Model 407 (N407LR) first flown 21 April 1994 (standard Bell 206L-3 modified with tailboom and dynamic system of military OH-58D, plus sidewall fairings to simulate broader fuselage); programme first revealed at Heli-Expo '95, Las Vegas, January 1995. Two prototype/preproduction 407s (C-GFOS and C-FORS) first flown on 29 June and 13 July 1995, respectively; first production airframe (C-FWQY/N407BT) flown 10 November 1995. Transport Canada certification 9 February 1996, with FAA certification same day, as extension of Bell 206 certificate; first customer delivery at Heli-Expo '96, Dallas, in February. MoU of June 1996 provided for licensed assembly and marketing by Durgantara (formerly IPTN) of Indonesia.

Law Enforcement Demonstrator being promoted from 2002 features bubble windows, NightSun searchlights and FLIR, equipped by Edwards and Associates of Bristol, Tennessee.

Improvements under consideration in late 2003 included night vision goggles (NVG) qualification, and extended maintenance intervals aimed at reducing operating costs.

CURRENT VERSIONS: Bell 407: As described.

Bell ARH: Described separately.

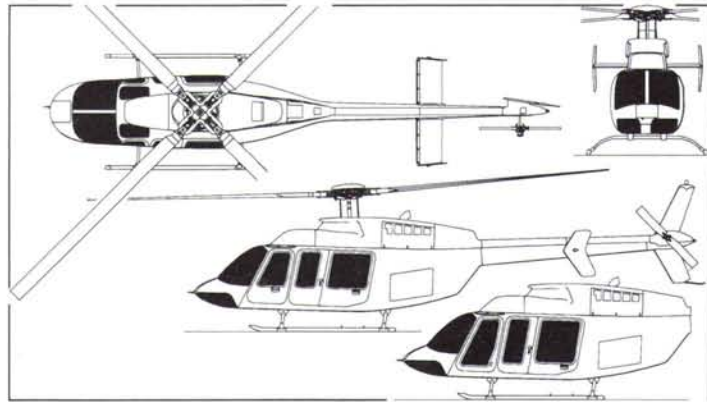
CUSTOMERS: Launch customers Petroleum Helicopters, Niagara Helicopters and Greenland Air. The 500th production Bell 407 was delivered in October 2001 to Pabst Air, Germany; 700th exported to Guatemala in October 2006. Fleet time in October 2004 totalled more than 1,170,000 hours, with two high-time airframes exceeding 10,000 hours each.

Law enforcement operators include Tampa Police Department, Florida; Palm Beach County Sheriff's Office; and the State Police Departments of Connecticut, Delaware (four,



Bell 407 light utility helicopter (Peter J Cooper/Falcon Aviation)

1040561



Bell 407 seven-seat light helicopter, with scrap view of Hi-Visibility door version (Paul Jackson)

1158941

of which last delivered in early 2004), Louisiana, New York and Virginia. Recent customers include Air Methods Corporation of Englewood, Colorado, which took delivery of two in June 2003, bringing its fleet total to 20; Anne Arundel County Police Department (one); The Flitner Ranch of Wyoming (one); L E Jones Production Company of Duncan, Oklahoma (one); Life Flight Eagle of Kansas City, Missouri (two); Med-Trans Corporation of Bismarck, North Dakota (five, supplementing existing fleet of 14 Bell 407s and two JetRangers); Petroleum Helicopters Inc (six ordered in February 2005 for delivery in first quarter, bringing total fleet of 407s to 45); Rotorcraft Leasing, LLC (two, delivered by April 2004); and Las Vegas Helicopters (one). Selected by US Drug Enforcement Agency for its light utility helicopter requirement. Total of 62 delivered in 1999, 62 in 2000, 47 in 2001, 33 in 2002, 46 in 2003, 40 in 2004, and 41 in 2005.

COSTS: USD1.37 million (1999) flyaway. Average direct operating cost USD365.03 per hour (2004). Development cost estimated as USD50 million, of which USD9 million provided by Canadian government.

DESIGN FEATURES: As for JetRanger and LongRanger. Based on Bell 206L-4 LongRanger fuselage with cabin widened by 17.8 cm (7 in); 35 per cent larger cabin window area; Litton LCD active matrix cockpit displays; all-composites four-blade main rotor based on that of OH-58D, with soft-mounted pylon isolation system; single Rolls-Royce 250-C47 turboshaft; enlarged vertical stabilisers. 'Ring-fin' shrouded rotor tested in 1995 as possible future option. Rotor speed 413 rpm.

STRUCTURE: Generally as for LongRanger, but with carbon fibre tailboom and flush-fitting cabin door windows and skylights.

LANDING GEAR: LongRanger unit modified to match new rotor's ground-resonance characteristics, and with rear cross-tube pivoted in centre between outboard damping pads. High skids, low skid fairings and pop-out floats, optional.

POWER PLANT: One Rolls-Royce 250-C47B turboshaft rated at 606 kW (813 shp) for T-O, 523 kW (701 shp) maximum continuous; transmission rating 503 kW (674 shp) for T-O, 470 kW (630 shp) continuous operation. Single-channel FADEC standard. Standard usable fuel capacity 484 litres (128 US gallons; 106.6 Imp gallons); optional auxiliary fuel tank in aft baggage compartment, usable capacity 72 litres (19 US gallons; 15.8 Imp gallons); oil capacity 5.7 litres (1.5 US gallons; 1.25 Imp gallons). 'Quiet Cruise' system, in development in early 1997, reduces flyover noise level by using FADEC to reduce rotor rpm to 90 to 93 per cent in the cruise, with accompanying reduction in VNE to 110 kt (204 km/h; 126 mph).

ACCOMMODATION: With a crew of two, standard cabin layout accommodates five passengers in two rearward-facing seats with centre armrest/console, and three forward-facing seats, all fabric-covered. Optional utility cabin has vinyl-covered seats; corporate interior features two extra-wide forward-facing seats in the outboard positions, an occasional-use seat in the centre and additional soundproofing. Supplementary type certificate awarded in November 2006 for Aeronautical Accessories Hi-Visibility doors with increased transparency area.

SYSTEMS: Electrical system, includes 28 V 17 Ah Ni/Cd battery and 180 A starter generator. AVIONICS: Bendix/King suite options to customer's choice include KX 155 and KX 165 nav/com, KY 196A VHF, KT 70 and KY 76A transponder, KR 87 ADF, KLN 89B GPS, KCS 35A compass system and ELT.

DIMENSIONS, EXTERNAL:

Main rotor diameter	10.67 m (35 ft 0 in)
Main rotor blade chord	0.27 m (10¾ in)
Tail rotor diameter	1.65 m (5 ft 5 in)
Tail rotor blade chord	0.16 m (6½ in)
Length: overall, rotors turning	12.74 m (41 ft 9½ in)
rotor in X configuration	11.16 m (36 ft 7¼ in) ¹
fuselage	10.58 m (34 ft 8½ in)
Stabiliser span over endplate fins	2.22 m (7 ft 3½ in)



Aeronautical Accessories Hi-Visibility doors, incorporating larger transparencies, fitted to Bell 407

1040565



Bell 407 of Titan Airways, based at Stansted, UK (Paul Jackson)

1043850

Height: over tailfin	3.10 m (10 ft 2 in)
overall: low skids	3.11 m (10 ft 2½ in)
high skids	3.32 m (10 ft 10¾ in)
Ground clearance:	3.10 m (10 ft 2 in)
low skids	0.41 m (1 ft 4 in)
high skids	0.62 m (2 ft 0½ in)
Width: over skids	2.29 m (7 ft 6 in)
rotor in X configuration	7.65 m (25 ft 1¼ in)
Rear cabin door:	
Width: port	1.55 m (5 ft 1 in)
starboard	0.91 m (3 ft 0 in)
Height to sill (standard skids)	0.51 m (1 ft 8 in)

¹ Blades at 45° to fuselage centreline

DIMENSIONS, INTERNAL:	
Cabin: Max width	1.37 m (4 ft 6 in)
Max height	1.00 m (3 ft 3¼ in)
Baggage compartment volume	0.45 m ³ (16.0 cu ft)

AREAS:	
Main rotor disc	89.38 m ² (962.1 sq ft)
Tail rotor disc	2.08 m ² (22.34 sq ft)

WEIGHTS AND LOADINGS:	
Weight empty, equipped	1,209 kg (2,665 lb)
Max payload	1,173 kg (2,585 lb)
Max baggage	113 kg (250 lb)
Max hook capacity	1,200 kg (2,646 lb)
Max T-O weight: internal load:	
standard	2,268 kg (5,000 lb)
optional	2,381 kg (5,250 lb)
external load	2,721 kg (6,000 lb)
Max disc loading	27.9 kg/m ² (5.72 lb/sq ft)
Max disc loading: internal load:	
standard	25.4 kg/m ² (5.20 lb/sq ft)
optional	26.6 kg/m ² (5.46 lb/sq ft)
external load	30.4 kg/m ² (6.24 lb/sq ft)
Transmission loading at max T-O weight and power:	
internal load: standard	4.52 kg/kW (7.42 lb/shp)
optional	4.74 kg/kW (7.79 lb/shp)
external load	5.42 kg/kW (8.90 lb/shp)

PERFORMANCE (at standard internal load MTOW, ISA):	
Never-exceed speed (VNE)	140 kt (259 km/h; 161 mph)
Max cruising speed:	
at S/L	133 kt (246 km/h; 153 mph)
at FL 40	135 kt (250 km/h; 155 mph)

Long-range cruising speed:	
at S/L	121 kt (224 km/h; 139 mph)
at FL 40	120 kt (222 km/h; 138 mph)
Max certified T-O height	5,180 m (17,000 ft)
Max certified altitude	6,100 m (20,000 ft)
Hovering ceiling: IGE	3,720 m (12,200 ft)
OGE	3,185 m (10,450 ft)
Max range	330 n miles (611 km; 379 miles)
Endurance	3 h 42 min

BELL 412

Canadian Forces designation: CH-146 Griffon
UK armed forces designations: Griffin HT, Mk 1 and HAR, Mk 2

TYPE: Multirole medium helicopter.
PROGRAMME: Original 412 announced 8 September 1978; FAR Pt 29 VFR approval received 9 January 1981, (as extension of original Bell 212 certificate of 30 October 1970); IFR 13 February 1981; 213 built in USA; production (SP version) transferred to Canada February 1989; first delivery (civil) 18 January 1981. Production licences obtained by Dirgantara of Indonesia and Agusta of Italy, but Indonesian aircraft not certifiable in US.

Increase in payload of 91 kg (200 lb) in development in late 2003, through use of composites in engine access doors, chemical milling of landing gear skids and removal of mountings and avionics boxes for redundant equipment.

CURRENT VERSIONS: **412SP**: Special Performance version with increased maximum T-O weight, new seating options and 55 per cent greater standard fuel capacity. No change to Type Certificate; marketing designation only. Superseded by 412HP early 1991.

412HP: Improved transmission giving better OGE hover; first delivery February 1991. No change to Type Certificate; marketing designation only.

412EP: (Enhanced Performance) PT6T-3D engine, dual digital automatic flight control system (DDAFCS), three-axis in basic aircraft but customer option for four-axis and EFIS. FAA certification 23 June 1994. Also customer option for SAR fit. Now only current version.

Detailed description applies to Bell 412EP.

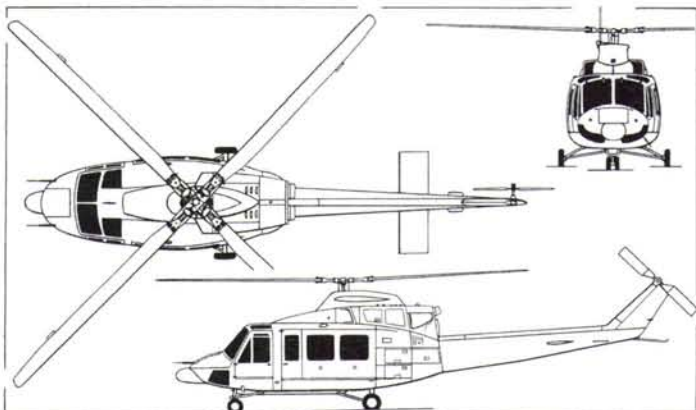
Military 412: Announced by Bell June 1986; fitted with Lucas Aerospace chin turret and Honeywell Head Tracker helmet sight similar to that in AH-1S; turret carries 875 rounds, weighs 188 kg (414 lb) and can be removed in under 30 minutes; firing arcs ±110° in azimuth, +15° and -45° in elevation; other armament includes twin dual FN Herstal 7.62 mm gun pods, single FN Herstal 0.50 in pod, pods of seven or nineteen 2.75 in rockets, M240E1 pintle-mounted door guns, FN Herstal four-round 70 mm rocket launcher and a 0.50 in gun or two Giat M621 20 mm cannon pods.

412CF (CH-146) Griffon: Canadian Forces C\$700 million contract for 100 CH-146s (modified Bell 412EP) placed in 1992. Duties include armed support, troop/cargo transport,



Bell 412 resupplying an offshore oil rig

1151688



Bell 412EP (P&WC PT6T turboshaft) (Dennis Punnett)

1151700

medevac, ASW, SAR and patrol; first flight (146000) 30 April 1994; deliveries began 14 October 1994; completed early 1998. Generally as commercial Bell 412EP except for avionics and mission equipment; FAA certification 2 March 1995; Canadian certification eight days later. Empty weight 3,402 kg (7,500 lb); maximum weight as civil version.

412EP Sentinel: First of two modified in 1998 by Heli-Dyne Systems with quick-change ASW and ASW mission packages; intended for Ecuadorian Navy, but order cancelled and aircraft became demonstrator. ASW equipment comprises Honeywell RDR-1500B chin radar, Hughes Starburst searchlight, radar warning receiver, Wescam sensor turret and possibly Penguin Mk 2 Mod 7 ASMs; ASW fit is L3 Ocean Systems AN/AQS-18A dipping sonar and Raytheon Mk 46 torpedo.

412SA: First three of 16 ordered by Royal Saudi Air Force built in 2001 for manufacturer's trials. Equipment standard not disclosed, but sufficiently different from 412EP to warrant separate c/n sequence beginning 33501. Production continued in 2002, although only eight confirmed built by late 2003. Further aircraft produced by AgustaWestland in 2003.

412 Plus: Projected improved version under study in 1999 with MTOW increased to 5,647 kg (12,450 lb), uprated PT6C engines, new dynamic components and Rogerson-Kratos avionics. Development terminated in early 2001.

NBell-412: Indonesia's Dirgantara obtained a licence to produce up to 100 Model 412SPs. Production ended by 1997 after approximately 36 aircraft.

CUSTOMERS: Some 713 Bell 412s of all versions built in North America by early 2006, comprising 115 Model 412s, 114 412SPs, 81 412HPs, 295 412EPs, 100 CH-146s and eight 412SAs. 26 delivered in 1999 and 24 in 2000; 22 in 2001 (including five to El Salvador), 25 in 2002 (including five to Saudi Arabia), 29 in 2003 (including nine assembled by AgustaWestland to Saudi Arabia); 31 in 2004, including examples for Mexico and Pakistan; and 29 (including 12 military) in 2005.

Military deliveries include Venezuelan Air Force (two), Botswana Defence Force (three), Public Security Flying Wing of Bahrain Defence Force (two), Sri Lankan armed forces (four), Nigerian Police Air Wing (two), Mexican government (two VIP transports), South Korean Coast Guard (one), Honduras (10), Royal Norwegian Air Force (19, of which 18 assembled by Helikopter Service, Stavanger, to replace UH-1Bs of 339 Squadron at

Bardufoss and 720 Squadron at Rygge). Three 412EPs delivered to Slovenian Territorial Forces in 1995, for border patrol and rescue duties; four ordered by Philippine Air Force late in 1996, comprising two for VVIP transport and two SAR.

First of nine 412EPs entered service in April 1997 as HT. Mk 1s with civilian-operated Defence Helicopter Flying School at RAF Shawbury, UK, within which they constitute No. 60 (Reserve) Squadron, RAF; two more ordered in May 2002, together with four H.A.R. Mk 2s, latter replacing Wessex SAR helicopters of No. 84 Squadron at Akrotiri, Cyprus, from April 2003. Four in SAR/utility fit delivered to Venezuelan Navy, 1999.

Recent customers include the National Defence Secretariat of Mexico, which took delivery of four in mid-2002; Venezuelan Navy, which ordered four in SAR configuration in early 2002; Khalifa Airways of Algeria, which took delivery of one 412EP in June 2002; Aerosservicios Especializados SA of Mexico, which ordered 10 412EPs; New York City Police Aviation Department, which took delivery of one 412EP in September 2003; the Government of Pakistan, which has ordered 26 412EPs, of which nine were delivered in June 2004, with final delivery scheduled for May 2005; and the National Police Agency of Japan, which ordered two 412EPs for delivery in early 2005.

COSTS: Bell 412EP, VFR-equipped USD4.895 million (1999); Bell 412EP, IFR-equipped USD5.12 million (1999). Average direct operating cost USD750.34 per hour (2004).

DESIGN FEATURES: Four-blade main rotor with blades retained within central metal star fitting by single elastomeric bearings; shorter rotor mast than 212; blades can be folded; rotor brake standard; two-blade tail rotor; main rotor rpm 314.

FLYING CONTROLS: Fully powered hydraulic controls; gyroscopic stabiliser bar above main rotor; automatic tailplane incidence control.

STRUCTURE: Generally of conventional light metal. Main rotor blade spar unidirectional glass fibre with 45° wound torque casing of glass fibre cloth; Nomex rear section core with trailing-edge of unidirectional glass fibre; leading-edge protected by titanium abrasion strip and replaceable stainless steel cap at tip; lightning protection mesh embedded; provision for electric de-icing heater elements; main rotor hub of steel and light alloy; all-metal tail rotor.

LANDING GEAR: High skid, emergency pop-out float or non-retractable tricycle gear optional. Spats optional for last-named.

POWER PLANT: Pratt & Whitney Canada PT6T-3D Turbo Twin-Pac, rated at 1,342 kW (1,800 shp) for T-O and 1,193 kW (1,600 shp) maximum continuous. OEI ratings 850 kW (1,140 shp) for 2½ minutes, or 723 kW (970 shp) for 30 minutes. Transmission rating 1,022 kW (1,370 shp) for T-O. 828 kW (1,110 shp) maximum continuous; OEI rating 850 kW (1,140 shp). Optional 30 kW (40 shp) for accessory drives from main gearbox.

Seven interconnected rupture-resistant fuel cells, with automatic shutoff valves (breakaway fittings), have a combined usable capacity of 1,249 litres (330 US gallons; 275 Imp gallons). Two 76 or 310.5 litre (20.0 or 82.0 US gallon; 16.7 or 68.3 Imp gallon) auxiliary fuel tanks, in any combination, can increase maximum total capacity to 1,870 litres (494 US gallons; 411.6 Imp gallons). Single-point refuelling on starboard side of cabin.

ACCOMMODATION: Pilot and up to 14 passengers: one in front port seat and 13 in cabin. Dual controls optional. Accommodation heated and ventilated.

SYSTEMS: Dual hydraulic systems, pressure 69 bar (1,000 lb/sq in) each. 28 V DC electrical system supplied by two completely independent 450 VA inverters. 40 Ah Ni/Cd battery.

AVIONICS: *Comms:* Optional IFR avionics include dual Bendix/King Gold Crown III.

Radar: Weather radar optional.

Flight: Dual KNR 660A VOR/LOC/RMI receivers, KDF 800 ADF, KMD 700A DME, KXP 750A transponder and KGM 690 marker beacon/glideslope receiver. Optional Honeywell AFCS.

EQUIPMENT: Optional equipment includes cargo sling and rescue hoist.

DIMENSIONS, EXTERNAL:

Main rotor diameter	14.02 m (46 ft 0 in)
Main rotor blade chord: at root	0.40 m (1 ft 4 in)
at tip	0.22 m (8½ in)
Tail rotor diameter	2.62 m (8 ft 7 in)
Tail rotor blade chord	0.29 m (11½ in)
Length: overall, rotors turning	17.12 m (56 ft 2 in)
fuselage, excl rotors	12.70 m (41 ft 8 in)
Height: to top of rotor head	3.48 m (11 ft 5 in)
overall, tail rotor turning	4.57 m (15 ft 0 in)
Stabiliser: span	2.87 m (9 ft 5 in)
chord	0.79 m (2 ft 7 in)
Width over skids	2.84 m (9 ft 4 in)
Rear sliding doors (each): Height	1.24 m (4 ft 1 in)
Width	1.88 m (6 ft 2 in)
Height to sill	0.76 m (2 ft 6 in)
Baggage compartment door: Height	0.53 m (1 ft 9 in)
Width	1.71 m (5 ft 7 in)
Emergency exits (centre cabin windows, each):	
Height	0.76 m (2 ft 6 in)
Width	0.97 m (3 ft 2 in)

DIMENSIONS, INTERNAL:

Baggage compartment volume	0.79 m³ (28.0 cu ft)
----------------------------	----------------------

AREAS:

Main rotor disc	154.40 m² (1,661.9 sq ft)
Tail rotor disc	5.38 m² (57.86 sq ft)

WEIGHTS AND LOADINGS:

Weight empty, standard equipped: VFR	3,113 kg (6,863 lb)
IFR	3,160 kg (6,966 lb)
Max external hook load	2,041 kg (4,500 lb)
Useful load: VFR	2,285 kg (5,037 lb)
IFR	2,238 kg (4,934 lb)
Max T-O and landing weight, internal or external load	5,397 kg (11,900 lb)
Max disc loading	35.0 kg/m² (7.16 lb/sq ft)
Transmission loading at max T-O weight and power	5.29 kg/kW (8.69 lb/shp)

PERFORMANCE:

Never-exceed speed (VNE)	140 kt (259 km/h; 161 mph)
Max cruising speed: at S/L	122 kt (226 km/h; 140 mph)
at FL50	124 kt (230 km/h; 143 mph)
Long-range cruising speed at FL50	130 kt (241 km/h; 150 mph)
Service ceiling, OEI, continuous power	1,646 m (5,400 ft)
30 min power rating	2,316 m (7,600 ft)
Hovering ceiling: IGE	3,110 m (10,200 ft)
OGE	1,585 m (5,200 ft)
Range at FL50, long-range cruising speed, standard fuel, no reserves	402 n miles (744 km; 462 miles)
Endurance	3 h 42 min

OPERATIONAL NOISE LEVELS (FAR Pt 36) (412 EP):

T-O	92.8 EPNdB
Flyover	93.4 EPNdB
Approach	95.6 EPNdB

BELL 417

TYPE: Light utility helicopter.
 PROGRAMME: Previously unannounced mockup unveiled at Heli-Expo, Dallas, Texas, 26 February 2006. First flight then planned for April 2006, but delayed, although engine running began 8 May; and maiden sortie (N417TX) eventually achieved on 1 June 2006 (but not announced until 17 July); programme cancelled 1 March 2007.
 CUSTOMERS: Total of 46 sales announced during February 2006 debut.
 DESIGN FEATURES: Development of Bell 407 with 723 kW (970 shp) Honeywell HTS900 turboshaft providing more power, more payload and improved hot and high performance. Basic fit includes cabin with club seating for five; improved 'bubble cockpit' providing greater headroom (accommodation for 95 percentile male wearing helmet with NVG equipment stowed); integrated Chelton EFIS; dual VHF-com, GPS/WAAS, AD/AHRS, transponder, and ICS audio panel; new FADEC equipped with dual electronic control units (ECU) offering dual channel reliability.



Mockup of Bell 417 unveiled on 26 February 2006

1158282

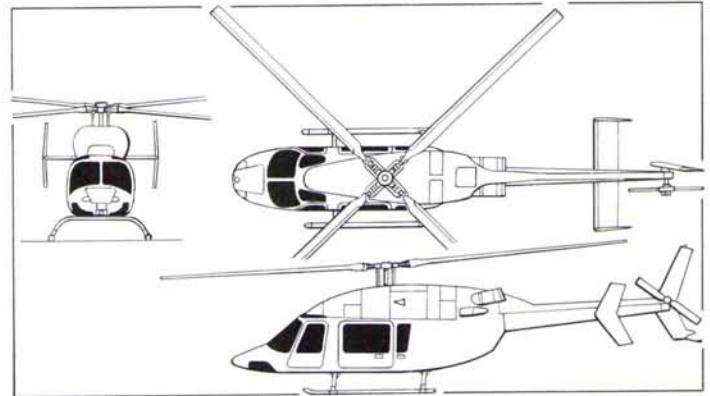


Maiden flight of Bell 417

1159102

BELL 427

TYPE: Light utility helicopter.
 PROGRAMME: Launched as New Light Twin (NLT) in February 1996 on signature of collaborative agreement with Samsung Aerospace Industries of South Korea. Prototype assembly began early 1997; first flight (C-GBLL) 11 December 1997; second prototype (C-FCSS) completed February 1998; two prototypes undertook flight test programme, gaining Transport Canada certification on 19 November 1999; FAA VFR certification achieved 24 January 2000. First production aircraft (C-GDEJ) flown June 1998; compared with prototypes, production 427 has longer exhausts and revised upper surface contours.
 CURRENT VERSIONS: **Bell 427/VFR:** As described.



Bell 427 light utility helicopter (James Goulding)

0552086

427i: Single-pilot IFR version. Announced at Heli-Expo 2004 in Las Vegas in March 2004; on 19 June 2004 Bell signed agreements with Korea Aerospace Industries Ltd and Mitsui Bussan Aerospace Ltd for joint development, with KAI responsible for the design and manufacture of the fuselage, cabin wiring and fuel system. FAA certification scheduled for fourth quarter 2006, with first customer deliveries then expected in late 2007. Compared to the 427VFR, in addition to IFR capability, the 427i has a 0.355 m (1 ft 2 in) fuselage stretch; uprated 820 kW (1,100 shp) transmission; dual hydraulic systems; Garmin GNS 430 GPS/com/nav; 'third generation' glass cockpit with Rogerson-Kratos large format MFDs; three-axis autopilot (four-axis optional) coupled to the nav system and incorporating a stability augmentation system; and Bell-developed aircraft data interface unit (ADIU) with automatic engine monitoring, logging and tracking, power assurance hover performance and weight and balance capability. Provisional data include: useful load 1,225 kg (2,700 lb); maximum take-off weight external load 3,175 kg (7,000 lb); maximum cruising speed 142 kt (263 km/h; 163 mph); and maximum range 365 nm (676 km; 420 miles). Total of 47 orders held by July 2004, including 15 for launch customer Air Methods Corporation for delivery at the rate of three per year from late 2007. Development halted in favour of Bell 429, described below.

SB427: South Korean version; planned licence production by KAI abandoned in 2003 after only two demonstrators produced.

Super Kiowa: Proposed armed scout offered by Bell.

CUSTOMERS: Orders for 22 placed during the mockup's first public display at Farnborough Air Show 1996; 85 on order by May 2000 from 50 customers, including five sold by Samsung to CitiAir in South Korea. Deliveries began 2000, but only 50 produced up to early 2006. Total of five delivered during 2000, 15 in 2001, five in 2002, seven in 2003, nine in 2004 and five in 2005. MoU signed in 1999 with Elbit Systems Inc for joint pre-design phase of military light helicopter using Bell 427 as baseline platform.

COSTS: 427i USD3.7 million (2004). Direct operating cost (427VFR) USD514.40 per hour (2004).

DESIGN FEATURES: Similar in appearance to Bell 407, with cabin stretch of 33 cm (13 in), but is all-new design, incorporating twin-engine safety margins. Flight dynamics based on four-blade rotor system of Bell OH-58D Kiowa (see US section), allied to tail rotor of Bell 407; folding main blades. Main rotor rpm 395; tail rotor rpm 2,375. Purpose-designed 'flat pack' main transmission, with direct input from both engines, has only four gear meshes to simplify design and operation. Transmission attached to airframe by four liquid-inertia vibration eliminators. First Bell helicopter designed entirely with use of computer (Dassault CATIA programme).

FLYING CONTROLS: Sextant AFDS 95-1 AFCS, with two- to four-axis autopilot computer. Flight director computer and associated equipment, to be certified by 2000.

STRUCTURE: Generally as for Bell 206, but extensive use of carbon/epoxy composites reduces airframe parts count by some 33 per cent. Cabin floor and roof are flat panels for ease of manufacture; minimal use of curved panels elsewhere. Composites main and tail rotors; main blades have nickel-plated stainless steel leading-edges. Soft-in-plane hub of main rotor employs a composites flexbeam yoke and elastomeric joints, eliminating lubrication and maintenance requirements. Brake and main rotor blade folding optional. Composites cabins and rolled aluminium tailbooms built by Samsung; assembly in Canada, except for sales to Korea and China; Hexcel honeycomb as stiffener.



Bell 427 light utility helicopter (Paul Jackson)

1151689

LANDING GEAR: Twin skids with dynamically tuned cross tubes to reduce ground resonance. Low skids standard; optional high skids and emergency floats.

POWER PLANT: Two Pratt & Whitney Canada PW207D turboshafts with FADEC, each rated at 529 kW (710 shp) for T-O (5 minutes) or 466 kW (625 shp) maximum continuous; OEI ratings 611 kW (820 shp) for 30 seconds, 582 kW (780 shp) for 2 minutes, 559 kW (750 shp) for 30 minutes or 529 kW (710 shp) maximum continuous. Twin-engine transmission rating, T-O and maximum continuous, 597 kW (800 shp). OEI transmission rating, 485 kW (650 shp) for 30 seconds; 451 kW (605 shp) for 2 minutes; 343 kW (460 shp) maximum continuous.

Fuel contained in three crash-resistant tanks; two forward, one aft, total usable capacity 770 litres (203.5 US gallons; 169 Imp gallons). One forward fuel tank can be removed in EMS configurations to provide additional stretcher space in cabin or to permit stretcher to extend into port side of cockpit. Oil capacity (total, both engines) 10.2 litres (2.69 US gallons; 2.24 Imp gallons).

ACCOMMODATION: Standard accommodation is for two crew in cockpit, on 20 g energy-attenuating seats, and six passengers in cabin on two rows of three seats in club configuration (all-forward-facing seats optional); all seats equipped with inertia-reel shoulder harnesses. Alternative configurations include corporate club-four seating with refreshment/entertainment console between each pair of seats, club-five with console between rearmost seats, or club-six, without consoles. Optional EMS interiors provide for carriage of one or two stretchers with up to two medical attendants, affording either full patient or head-only in-flight access, with single- or two-person crew. In cargo configuration, with all passenger seats removed, an optional removable flat cargo floor can be installed, equipped with integral tie-downs. Two forward-hinged doors each side; cabin doors, both sides, are forward-hinged, but port unit can be replaced by optional rearward-sliding door for cargo handling. External door on starboard side to rear baggage hold.

SYSTEMS: Hydraulic system, operating pressure 86 bar (1,250 lb/sq in), provides boost power for main and tail rotor controls; 28 V DC electrical power from 17 Ah Ni/Cd battery and two engine-mounted 17 Ah starter/generators; 28 Ah battery and 200 A starter/generator optional. Air conditioning optional.

AVIONICS: Rogerson-Kratos NeoAV two-screen LCD integrated instrument display system (IIDS) for monitoring engine instruments, fuel quantity, hydraulic and electrical systems and weight and balance functions. Rogerson Kratos NeoAV EFIS optional, featuring GPS interface, area navigation map, non-precision approach capability and weather radar display. Bendix/King nav/com avionics suite to customer's choice.

EQUIPMENT: Optional kits include engine air particle separator, cargo hook, cargo floor, sliding cabin door, external rescue hoist, NightSun searchlight, EMS installation and wire strike protection system.

DIMENSIONS, EXTERNAL:

Main rotor diameter	11.28 m (37 ft 0 in)
Main rotor blade chord	0.34 m (1 ft 1 1/4 in)
Tail rotor diameter	1.73 m (5 ft 8 in)
Tail rotor blade chord	0.18 m (7 1/4 in)
Length: overall, rotors turning	12.99 m (42 ft 7 1/4 in)
overall, rotor in X configuration	11.55 m (37 ft 10 3/4 in) ¹
fuselage, incl tailskid	10.97 m (36 ft 0 in)
low skids	3.23 m (10 ft 7 1/4 in)
high skids	3.49 m (11 ft 5 1/2 in)
Height over tailfin	3.49 m (11 ft 5 1/4 in)
Ground clearance: low skids	0.41 m (1 ft 4 1/4 in)
high skids	0.67 m (2 ft 2 1/2 in)
Width: overall, rotor in X configuration	8.24 m (27 ft 0 1/2 in) ¹
over skids	2.29 m (7 ft 6 in)
over tailfins	2.89 m (9 ft 5 3/4 in)
Cabin door: Height	1.07 m (3 ft 6 in)
Width	1.24 m (4 ft 0 3/4 in)

¹ Blades at 45° to fuselage centreline

DIMENSIONS, INTERNAL:

Cabin: Max height	1.30 m (4 ft 3 in)
Baggage hold volume	0.76 m ³ (27.0 cu ft)

AREAS:

Main rotor disc	99.89 m ² (1,075.2 sq ft)
Tail rotor disc	2.34 m ² (25.2 sq ft)

WEIGHTS AND LOADINGS (provisional):

Weight empty, standard	1,758 kg (3,875 lb)
Max payload	1,213 kg (2,675 lb)
Max baggage weight	113 kg (250 lb)
Max T-O weight: internal load:	2,880 kg (6,350 lb)
optional and external load	2,971 kg (6,550 lb)
Cargo hook capacity	1,361 kg (3,000 lb)
Max cargo floor loading	366.2 kg/m ² (75 lb/sq ft)
Max disc loading	29.74 kg/m ² (6.09 lb/sq ft)
Transmission loading at max T-O weight and power:	
internal load	4.56 kg/kW (7.50 lb/shp)
external load	4.98 kg/kW (8.19 lb/shp)

PERFORMANCE (at standard internal load MTOW, ISA):

Never-exceed speed (VNE)	140 kt (259 km/h; 161 mph)
Max cruising speed at S/L	138 kt (256 km/h; 159 mph)
Long-range cruising speed at S/L	134 kt (248 km/h; 154 mph)
Service ceiling:	
max continuous power	3,050 m (10,000 ft)
OEI (30 min)	2,438 m (8,000 ft)
Hovering ceiling: IGE	2,743 m (9,000 ft)
OGE	1,829 m (6,000 ft)
Range with max fuel, long-range cruising speed, no reserves	390 n miles (722 km; 449 miles)
Endurance	4 h 0 min

BELL 429 GLOBALRANGER

TYPE: Light utility helicopter.

PROGRAMME: Announced at Heli-Expo 2005 in Anaheim, 6 February 2005, when mockups of corporate and EMS versions unveiled; replaces proposed Bell 427i; systems and components being tested on Bell 427s during late 2005; main rotor blades thus test-flown in February 2006; first flight was scheduled for third quarter 2006 but prototype only registered (C-GBLL) on 23 January 2007; seven aircraft will participate in flight test and certification programme, leading to Transport Canada and FAA certification.

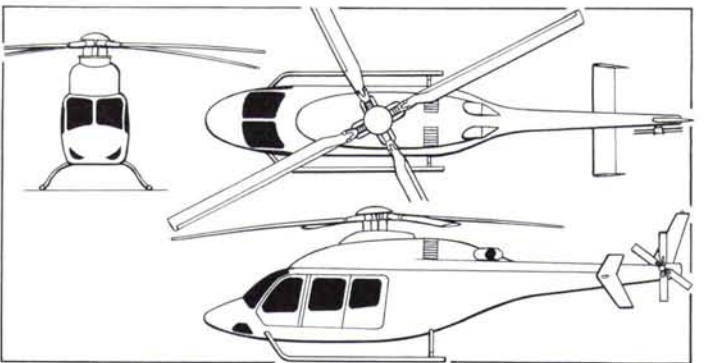
CUSTOMERS: Total of 90 orders held at time of launch, of which about 80 were converted from orders for the Bell 427i; 136 orders held by November 2005 including several in EMS configuration; 213 by July 2006.



Mockup of Bell 429 (Paul Jackson) 1040579



Prototype Bell 429 taking shape in late 2006 1154668



Bell 429 light utility helicopter (James Goulding) 1151426

COSTS: USD3.95 million; estimated direct operating cost USD480 per hour (both 2005).

DESIGN FEATURES: Design includes advanced technology elements of Bell's modular affordable product line (MAPL) studies. Features include advanced main rotor blade design with inverse taper ratio, more twist at root and swept tip shape; damage tolerant composites tailboom; two-piece composites driveshaft; and four-blade tail rotor.

STRUCTURE: Risk-sharing partner Korean Aerospace Industries manufactures cabin structure.

LANDING GEAR: High or low skid landing gear standard; retractable, wheeled landing gear optional.

POWER PLANT: Two Pratt & Whitney Canada PW207D turboshafts, each rated at 544 kW (730 shp). Fuel in underfloor tanks, maximum capacity 803 litres (212 US gallons; 177 Imp gallons).

ACCOMMODATION: Standard seating for pilot and up to seven passengers. Cockpit lighting is compatible with night vision goggles. Cabin has 7 per cent more volume than that of Bell 427 and features flat floor, tracked seating, sliding door on each side to facilitate side-loading of medical patients, and optional clamshell doors at rear. EMS interior features articulated patient loading system for wheeled and secondary patient litters; seats for three medical attendants; medical panel; medical storage cabinet; liquid oxygen storage system; pressurised gaseous oxygen system; high intensity lighting; intravenous solutions warmer and flip-down hooks for IV bags; soft goods storage, non-skid sealed medical floor; and medical equipment mounting bars and securing systems.

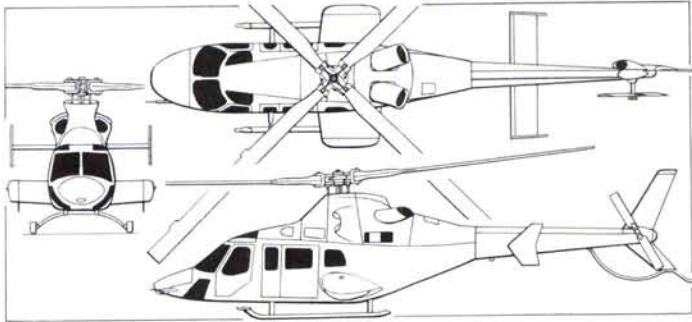
SYSTEMS: Dual hydraulic system, operating pressure 86 bar (1,250 lb/sq in). Avionics package includes health and usage management system with laptop access. Fully coupled three-axis autopilot standard.

AVIONICS: Single-pilot IFR cockpit features two 203 × 152 mm (8 × 6 in) Rogerson Kratos LCD colour displays, with third optional, twin Garmin GNS 430 GPS and Bendix/King radios.

DIMENSIONS, EXTERNAL:

Length overall	12.22 m (40 ft 1 1/4 in)
Tailplane span	3.02 m (9 ft 10 3/4 in)
Skid track	2.44 m (8 ft 0 in)

DIMENSIONS, INTERNAL:	
Cabin volume	5.7 m ³ (200 cu ft)
WEIGHTS AND LOADINGS:	
Weight empty	1,950 kg (4,300 lb)
Max T-O weight	3,175 kg (7,000 lb)
Cargo hook capacity	1,361 kg (3,000 lb)
PERFORMANCE (estimated):	
Never-exceed speed (VNE)	150 kt (278 km/h; 172 mph)
Max cruising speed	142 kt (263 km/h; 163 mph)
Econ cruising speed	138 kt (256 km/h; 159 mph)
Hovering ceiling: IGE	3,660 m (12,000 ft)
OGE	2,835 m (9,300 ft)
Range	350 n miles (648 km; 402 miles)
Endurance	3 h 48 min



Skid version of Bell 430 nine-seat helicopter (two Rolls-Royce 250 turboshafts)
(James Goulding) 1151695

TYPE: Light utility helicopter.
PROGRAMME: Preliminary design 1991; four-blade rotor, higher-powered and stretched variant of Bell 230; programme launched February 1992; two prototypes, modified from Bell 230 airframes: first prototype (C-GBLL; wheel-equipped) flown 25 October 1994; second prototype (C-GEXP; skid-equipped, with complete avionics suite) flown 19 December 1994; first flight of production 430 (C-GRND) in 1995; deliveries began 25 June 1996 after Canadian type approval on 23 February. MoU of June 1996 with Dirgantara (formerly IPTN) for licensed assembly and marketing in Indonesia. Under an agreement signed in September 2003, Hafei Aviation Industry Company Ltd of China will become sole supplier of Bell 430 airframes to the manufacturer.

Second production aircraft, N4300 circumnavigated the world in a record time of 17 days 6 hours 14 minutes, landing back at Fair Oaks, UK, on 3 September 1996.
In July 2004 c/n 49037/N430CH, operated by Chevron Texaco, became the high-time Bell 430 aircraft, having logged more than 7,000 flying hours since entering service in Gulf of Mexico offshore operations in July 1998.

CUSTOMERS: Total 116 helicopters registered by late 2005. First delivery 25 June 1996, when sixth production aircraft (N6282X) handed over to IPTN (now Dirgantara) of Indonesia in eight-seat executive configuration. Thirteen delivered in 1996; followed by eight, 15 and 18 in 1997-99, 11 in 2000, 14 in 2001, seven in 2002, eight in 2003, four in 2004 and 10 in 2005. Recent customers include Life flight Network of Portland, Oregon, which took delivery of one in August 2003, the University of Tennessee's Medical Center, which took delivery of two in 2003, replacing Bell 412s in its Lifestar EMS operation, and the US Department of Homeland Security, Customs and Border Protection, which has selected the Bell 430 for its twin-turbine medium utility helicopter requirement. Total of more than 100 built by late 2004.

COSTS: Programme USD18 million, 35 per cent financed by Canadian Defence Industry Productivity Program (DIPP) and repayable as royalty on each sale. Direct operating cost USD522.49 per hour (2004).

DESIGN FEATURES: Optimised for high cruising speed with (retractable) wheel landing gear, although traditional skids optional; inclined towards executive transport market. Bell 230 fuselage lengthened by 0.46 m (1 ft 6 in) plug; Bell 680 all-composites four-blade bearingless, hingeless main rotor; approximately 10 per cent power increase over Bell 230; uprated transmission; and optional EFIS. Short-span sponson each side of fuselage houses mainwheel units and fuel tanks, and serves as work platform.

FLYING CONTROLS: Fully powered hydraulic, with elastomeric pitch change and flapping bearings; fixed tailplane with leading-edge slats and endplate fins; strakes under sponsons; single-pilot IFR system without auto-stabilisation.

STRUCTURE: Semi-monocoque fuselage of light alloy, with limited use of light alloy honeycomb panels. Fail-safe structure in critical areas. One-piece nosecone tilts forward and down for access to avionics and equipment bay. Short span cantilever sponson set low on each side of fuselage, serving as main landing gear housings, fuel tanks and work platforms. Section NACA 0035. Dihedral 3° 12'. Incidence 5°. Sweepback at quarter-chord 3° 30'.

Fixed vertical fin in sweepback upper and lower sections. Tailplane, with slotted leading-edge and endplate fins, mounted midway along rear fuselage. Small skid below ventral fin for protection in tail-down landing. Four-blade main rotor with stainless steel spars and leading-edges, Nomex honeycomb trailing-edge with glass fibre skin, and glass fibre safety straps; tail rotor blades stainless steel. Rotors shaft-driven through gearbox with two spiral bevel reductions and one planetary reduction. Main blade and hub life, 10,000 hours.

LANDING GEAR: Tubular skid type on Utility version, Executive version has hydraulically retractable tricycle gear, single mainwheels retracting forward into sponsons; forward-retracting nosewheel fully castoring and self-centring; hydraulic disc brakes on main units. Mainwheel tyre size 18x5.5, nosewheel 5.00-5. Emergency floats optional.

POWER PLANT: Two Rolls-Royce 250-C40B turboshafts, each rated at 603 kW (808 shp) for T-O and 518 kW (695 shp) maximum continuous. OEL ratings 701 kW (940 shp) for

30 seconds, 656 kW (880 shp) for 2 minutes, 623 kW (835 shp) for 30 minutes and 602 kW (808 shp) continuous. Chandler Evans FADEC. Transmission rating 779 kW (1,045 shp) for 5 minutes for T-O, 737 kW (989 shp) maximum continuous. Power train TBO, 5,000 hours. Usable fuel capacity 935 litres (247 US gallons; 206 Imp gallons) in skid version, 710 litres (187.5 US gallons; 156 Imp gallons) in wheeled version; provision in both versions for 182 litre (48 US gallon; 40 Imp gallon) auxiliary tank. Fuel system is rupture resistant, with self-sealing breakaway fittings.

ACCOMMODATION: Standard layout has forward-facing seats for nine persons (two-two-two-three) including pilot. Options include 10-seat layout (two-two-three-three); eight-seat corporate (rear six in club layout), six-seat corporate (rear four in club layout with console between each pair); and five- and four-seat corporate with one or two refreshment cabinets; seat pitches vary between 86 cm (34 in) and 91 cm (36 in). Pilots on crashworthy (energy attenuating) seats, which are optional for passengers. Customised emergency medical service (EMS) versions also available, configured for pilot-only operation plus one or two pivotable stretchers and four or three medical attendants/sitting casualties respectively. Two forward-opening doors each side; EMS version has optional stretcher door between forward and rear doors on port side. Entire interior ram air ventilated and soundproofed. Dual controls optional.

SYSTEMS: Dual hydraulic systems (dual for main rotor collective and cyclic, single for tail rotor). Dual 28 V DC electrical systems, powered by two 30 V 200 A engine-mounted starter/generators (derated to 180 A) and a 24 V 28 Ah Ni/Cd battery.

AVIONICS: Comms: Bendix/King Gold Crown III.
Flight: Honeywell KFC 500 AFCS, GPS optional.

Instrumentation: Rogerson-Kratos LCD integrated instrument display system (IIDS) comprising two active matrix LCDs displaying engine and system parameters; optional Rogerson-Kratos EFIS.

EQUIPMENT: Standard equipment includes rotor and cargo tiedowns, ground handling wheels for skid version, retractable 450 W search/landing light. Options include dual controls, auxiliary fuel tankage, force/feel trim system, more comprehensive nav/com avionics, 272 kg (600 lb) capacity rescue hoist, 1,587 kg (3,500 lb) capacity cargo hook, emergency flotation gear, heated windscreen, particle separator and snow baffles.

DIMENSIONS, EXTERNAL:	
Main rotor diameter	12.80 m (42 ft 0 in)
Main rotor blade chord	0.36 m (1 ft 2 1/4 in)
Tail rotor diameter	2.10 m (6 ft 10 1/2 in)
Tail rotor blade chord	0.25 m (10 in)
Length: fuselage (incl tailskid)	13.44 m (44 ft 1 1/4 in)
overall, rotors turning	15.30 m (50 ft 2 1/2 in)
rotor in X configuration	9.40 m (30 ft 10 in)
Max width: rotors turning	15.30 m (50 ft 2 1/2 in)
rotor in X configuration	13.595 m (44 ft 7 1/4 in)
Fuselage max width over sponsons	3.45 m (11 ft 4 in)
Height to top of rotor head:	
standard skids	4.03 m (13 ft 2 1/2 in)
high skids	4.33 m (14 ft 2 1/2 in)
wheels	3.72 m (12 ft 2 1/2 in)
Stabiliser span	3.45 m (11 ft 4 in)
Skid track	2.54 m (8 ft 4 in)
Wheel track	2.78 m (9 ft 1 1/2 in)
Wheelbase	4.17 m (13 ft 8 1/4 in)
Passenger doors: forward:	
Height	1.34 m (4 ft 4 3/4 in)
Width	0.88 m (2 ft 10 3/4 in)



Bell 430 light utility helicopter (Paul Jackson) 1151687

aft:	
Height	1.22 m (4 ft 0 in)
Width	0.91 m (3 ft 0 in)
Baggage door: Height	0.60 m (1 ft 11½ in)
Width	0.85 m (2 ft 9½ in)
DIMENSIONS, INTERNAL:	
Cabin: Length, excl cockpit	2.46 m (8 ft 1 in)
Max width	1.37 m (4 ft 6 in)
Max height	1.30 m (4 ft 3 in)
Volume	4.5 m ³ (158 cu ft)
Baggage compartment volume	1.05 m ³ (37.2 cu ft)
AREAS:	
Main rotor disc	128.71 m ² (1,385.4 sq ft)
Tail rotor disc	3.45 m ² (37.12 sq ft)
WEIGHTS AND LOADINGS (A: wheeled version; B: skid version):	
Weight empty: A	2,433 kg (5,364 lb)
B	2,418 kg (5,331 lb)
Useful load: A	1,785 kg (3,936 lb)
B	1,800 kg (3,969 lb)
Max external load: A, B	1,270 kg (2,800 lb)
Max T-O weight, all conditions	4,218 kg (9,300 lb)
Max disc loading	32.8 kg/m ² (6.71 lb/sq ft)
Transmission loading at max T-O weight and power	5.42 kg/kW (8.90 lb/shp)
PERFORMANCE:	
Never-exceed speed (VNE):	
A, B	150 kt (277 km/h; 172 mph)
Max level speed: A	143 kt (265 km/h; 165 mph)
B	139 kt (257 km/h; 160 mph)
Long-range cruising speed:	
A	135 kt (250 km/h; 155 mph)
B	131 kt (243 km/h; 151 mph)
Service ceiling: A, B	4,932 m (16,180 ft)
Hovering ceiling, IGE: A, B	3,170 m (10,400 ft)
OGE: A, B	1,890 m (6,200 ft)
Max range, standard fuel, no reserves:	
A	275 n miles (509 km; 316 miles)
B	353 n miles (653 km; 406 miles)
Max endurance: A	2 h 48 min
B	3 h 48 min
OPERATIONAL NOISE LEVELS (FAR Pt 36, Stage 2):	
T-O	92.4 EPNdB
Sideline	91.6 EPNdB
Approach	93.8 EPNdB

BELL MODULAR AFFORDABLE PRODUCT LINE

TYPE: New-concept rotorcraft.

PROGRAMME: At the NBAA Convention in Orlando, Florida, in October 2003, Bell announced brief details of Modular Affordable Product Line (MAPL) programme that is expected to result in three all-new helicopters sharing common cockpits, avionics and tailbooms, mated to fuselage of common configuration but varying in size. Initial certification target is for the end of the decade, with first MAPL model available in 2008, and all three variants achieving service entry by 2012. Further data released in February 2004 mentioned the five-seat, single-engine **Bell 351**, eight-seat, single-engine **Bell 381**, and eight-seat **Bell 382** twin, all with four-blade rotors and 'fantail' anti-torque rotor. Design targets include 20 per cent improvements in speed and useful load, 20 per cent reduction in operating costs, and 10dB reduction in noise over existing helicopters in the same class, with 99 per cent despatch reliability. Price range expected to be between USD500,000 and USD1 million (2005).

MAPL 'TailFan' demonstrator, Bell 407 (N41835) modified with a 1.02 m (3 ft 4 in) diameter fan and duct replacing the standard tail rotor, made its first flight at Bell's XworX research center in Arlington, Texas, on 15 July 2004. It will be used for evaluation of the



Artist's impression of Bell MAPL

0580704



Bell TailFan demonstrator

0583649

performance and acoustics of various duct configurations in hover and forward flight. During altitude flight testing at Bell's facility in Leadville, Colorado, which was completed in October 2004, the MAPL demonstrator achieved hover out of ground effect (HOGE) at more than 3,566 m (11,700 ft), flight at more than 3,962 m (13,000 ft), and sideways flight up to 45 kt (83 km/h; 52 mph).

Some MAPL technology was introduced on the Bell 429 GlobalRanger, announced at the HAI Convention in Anaheim, California on 6 February 2005.

BLUE YONDER

BLUE YONDER AVIATION

Box 12, Suite 9, RR5, Calgary, Alberta T2P 2G6

Tel: (+1 403) 936 57 67

Fax: (+1 403) 936 51 08

e-mail: ezflyer@ezflyer.com

Web: www.ezflyer.com

PRESIDENT: Wayne Winters

Blue Yonder designed the E-Z Flyer in 1991; built under licence by Merlin in USA until bankruptcy of December 1995; production tooling transferred to Canada and manufacture of it (and Merlin GT) resumed; Aerocomp is US agent, although Blue Yonder responsible for global sales. The company has added the E-Z KingCobra and Harvard to its product line. Manufacturing is undertaken at Indus Winter Airport.

BLUE YONDER E-Z FLYER

TYPE: Tandem-seat kitbuilt.

PROGRAMME: First kitbuilt E-Zs delivered by Merlin mid-1995. Programme transferred in 1998 to Blue Yonder, which has also produced a twin-engined prototype, designated E-Z Flyer Twin.

CURRENT VERSIONS: **E-Z Flyer**: Basic version; *as described*.

E-Z Flyer Twin: As E-Z Flyer, but with two Rotax engines in range 37.0 to 73.5 kW (49.6 to 98.6 hp). Wing span 10.82 m (35 ft 6 in); maximum T-O weight 635 kg (1,400 lb). First flown 1999; prototype (C-ITEZ) only to date with second aircraft under construction late 2004.

CUSTOMERS: Total 52 kits sold by late 2005.

COSTS: E-Z Flyer USD17,090 including Rotax 503 engine; E-Z Flyer Twin USD31,950 including Rotax 503 engines (2006).

DESIGN FEATURES: Open tube fuselage married to high-mounted Aerocomp Merlin GT wing and tail sections. Quoted build time 300 hours for E-Z Flyer and 450 hours for E-Z Flyer Twin.

FLYING CONTROLS: Manual. Non-drooping Junkers-type ailerons.



Blue Yonder E-Z Flyer two-seat kitbuilt

0507562

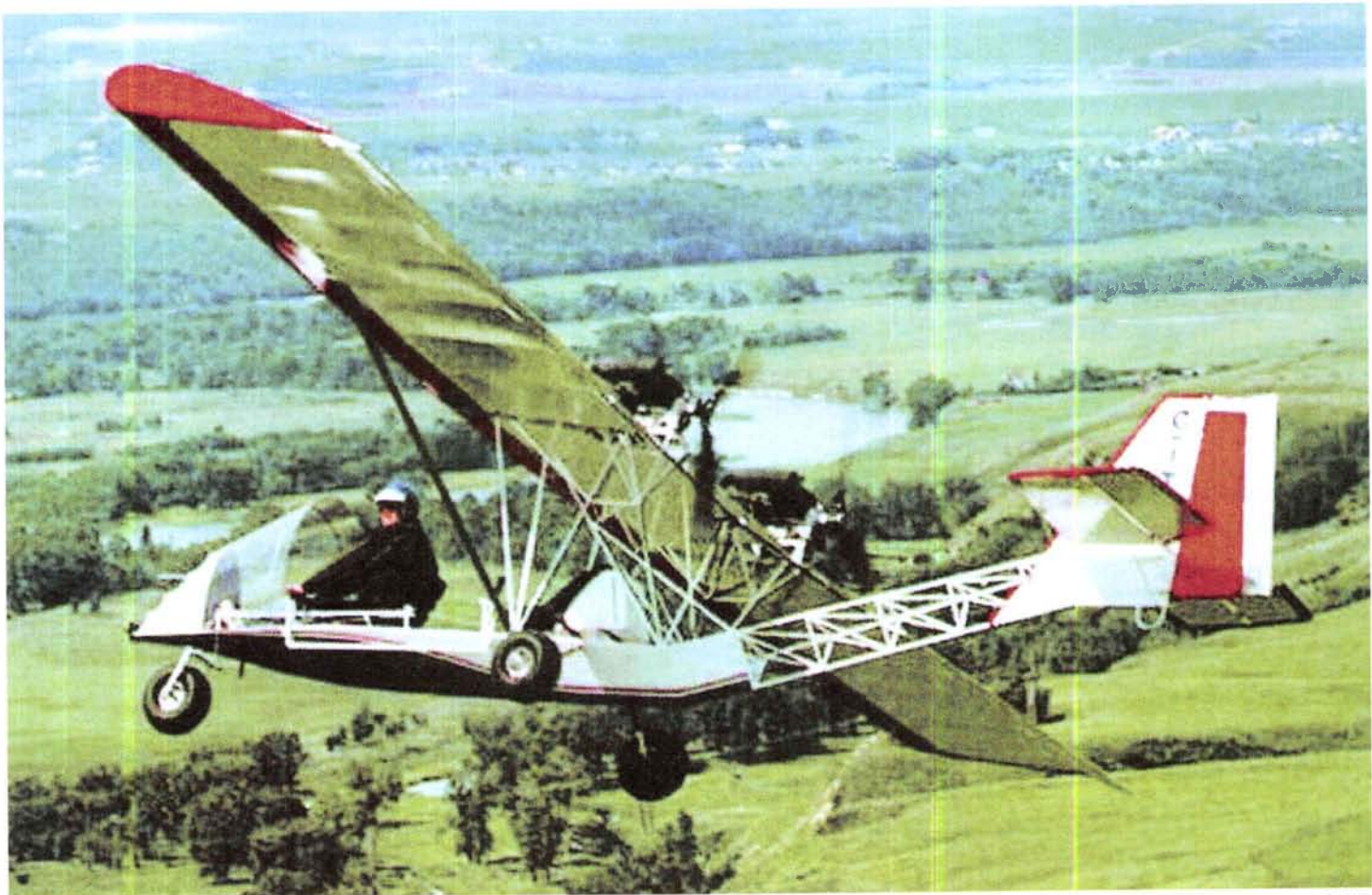
STRUCTURE: Fuselage is welded 4130 chromoly. Wings are aluminium D-cell construction with aluminium and Styrofoam constructed ribs; Stits Poly-Fiber covering.

LANDING GEAR: Tricycle type; fixed. Fuselage-mounted cantilever mainwheel legs. Hegar rims with brakes; solid spring steel legs; 18 in tundra tyres on mainwheels.

POWER PLANT: One 37.0 kW (49.6 hp) Rotax 503 or 47.8 kW (64.1 hp) Rotax 582 engine, driving a two- or three-blade pusher propeller. Fuel capacity 34 litres (9.0 US gallons; 7.5 Imp gallons), optionally expandable to 83 litres (22.0 US gallons; 18.3 Imp gallons) in E-Z Flyer and 125 litres (33.0 US gallons; 27.5 Imp gallons) in E-Z Flyer Twin.

DIMENSIONS, EXTERNAL (A: E-Z Flyer, B: E-Z Flyer Twin):

Wing span: A	9.45 m (31 ft 0 in)
B	10.82 m (35 ft 6 in)
Length overall: A	6.40 m (21 ft 0 in)
B	7.01 m (23 ft 0 in)
Height overall: A	1.83 m (6 ft 0 in)



Prototype E-Z Flyer Twin

0572291

AREAS:	
Wings, gross, incl extended tips: A	16.35 m ² (176.0 sq ft)
B	21.83 m ² (235.0 sq ft)
WEIGHTS AND LOADINGS:	
Weight empty: A	225 kg (495 lb)
B	358 kg (789 lb)
Max T-O weight: A	607 kg (1,340 lb)
B	657 kg (1,450 lb)
PERFORMANCE:	
Max level speed: both	87 kt (161 km/h; 100 mph)
Max cruising speed: both	56 kt (105 km/h; 65 mph)
Stalling speed: A	35 kt (65 km/h; 40 mph)
B	33 kt (62 km/h; 38 mph)
Max rate of climb at S/L: A	137 m (450 ft)/min
T-O run: A	31 m (100 ft)
B	15 m (50 ft)
T-O to 15 m (50 ft): A	99 m (325 ft)
Landing from 15 m (50 ft): A	61 m (200 ft)
Landing run: A, B	53 m (175 ft)
Range: A	330 n miles (611 km; 379 miles)
B	350 n miles (648 km; 402 miles)



Blue Yonder E-Z KingCobra

0572304

BLUE YONDER E-Z KINGCOBRA

TYPE: Single-seat ultralight kitbuilt.
PROGRAMME: Designed by Blue Yonder for Dr Jack Barlass; prototype (C-IFWW) first flown late 1998. Aircraft and design rights later purchased from Barlass estate.
CURRENT VERSIONS: **King Cobra:** As described.
Harvard: Adaptation resembling North American AT 6 Texan/Harvard.
CUSTOMERS: Two (one of each version) flying by end 2004.
COSTS: Kingcobra kit USD21,625 including Rotax 582 engine; firewall back USD13,855; Harvard: kit USD22,275 including Rotax 582 engine; firewall back USD14,270 (2006).
DESIGN FEATURES: Low-wing monoplane; uses (shortened) wing from Merlin and E-Z Flyer allied to new tail unit. Options include electric starter. Quoted build time 400 hours.
FLYING CONTROLS: Manual. Junkers-type ailerons.
STRUCTURE: Fabric covered 4130 chromoly welded steel tube fuselage and fabric-covered aluminium D cell cantilever wings.
LANDING GEAR: Tailwheel type. Hegar 46 cm (18 in) wheels and tundra tyres standard. Hydraulic brakes.
POWER PLANT: One 47.8 kW (64.1 hp) Rotax 582 UL driving two-blade, wooden propeller; design will accept engines up to 73.5 kW (98.6 hp). Fuel capacity 91 litres (24.0 US gallons; 20.0 Imp gallons).
DIMENSIONS, EXTERNAL:
Wing span 8.23 m (27 ft 0 in)
Length overall 6.40 m (21 ft 0 in)
Height overall 1.83 m (6 ft 0 in)
AREAS:
Wings, gross 14.68 m² (158.0 sq ft)



Blue Yonder Harvard

0572303

WEIGHTS AND LOADINGS:	
Weight empty	246 kg (543 lb)
Max T-O weight	544 kg (1,200 lb)
PERFORMANCE:	
Never-exceed speed (VNE)	104 kt (193 km/h; 120 mph)
Normal cruising speed	78 kt (145 km/h; 90 mph)
Stalling speed	27 kt (49 km/h; 30 mph)
Max rate of climb	305 m (1,000 ft)/min
Service ceiling	4,265 m (14,000 ft)
T-O run	46 m (150 ft)
Landing run	69 m (225 ft)
Range	540 n miles (1,000 km; 621 miles)

BOMBARDIER

BOMBARDIER AEROSPACE

400 Chemin de la Côte Vertu West, Dorval, Québec H4S 1Y9
Tel: (+1 514) 855 50 00
Fax: (+1 514) 855 79 03
Web: www.aero.bombardier.com
DESIGN DIVISIONS:

- Bombardier Aerospace Montreal:** formerly Canadair; follows Bombardier entry
- Bombardier Aerospace Toronto:** formerly de Havilland; follows Bombardier Aerospace Montreal entry
- Bombardier Aerospace Learjet:** see under US under Learjet
- Bombardier Aerospace Belfast:** formerly Shorts
- PRESIDENT AND COO: Pierre Beaudoin
- EXECUTIVE VICE-PRESIDENT, ENGINEERING AND PRODUCT DEVELOPMENT: John Holding
- EXECUTIVE VICE-PRESIDENT, PROGRAMS AND STRATEGIC PLANNING: Steven A Ridolfi
- VICE-PRESIDENT, OPERATIONS: Ken Brunle
- VICE-PRESIDENT, FINANCE: Claude Ferland
- PRESIDENT, REGIONAL AIRCRAFT: John Giraudy
- PRESIDENT, BUSINESS AIRCRAFT: Peter Edwards
- PRESIDENT, AMPHIBIOUS AIRCRAFT: Michael Bourgeois
- PRESIDENT, NEW COMMERCIAL AIRCRAFT PROGRAMMES: Gary R Scott

Bombardier Inc, a diversified Canadian corporation with 79,000 employees, formed Bombardier Aerospace in 1986, subsequently combining design and manufacturing activities of Canadair (1986), de Havilland (1992), Learjet (1990) and Shorts (1989). Sales, marketing and support are conducted by the Amphibious Aircraft, Regional Aircraft and Business Aircraft units.

Bombardier Aerospace also designs and manufactures components for Airbus and Boeing. Bombardier Aerospace's revenue for the year ended 31 January 2005 totalled CAD15.8 billion. Employment stood at 27,100 worldwide in late 2005.

BOMBARDIER AEROSPACE MONTREAL OPERATIONS

400 Chemin de la Côte Vertu West, Dorval, Québec H4S 1Y9
POSTAL ADDRESS: PO Box 6087, Station Centreville,
Montréal, Québec H3C 3G9
Tel:(+1 514) 855 50 00
Fax:(+1 514) 855 79 03
Web: www.aero.bombardier.com
VICE-PRESIDENT AND GENERAL MANAGER, OPERATIONS: Serge Perron
VICE-PRESIDENT, OPERATIONS, ST LAURENT PLANT: Jean Séguin
VICE-PRESIDENT, OPERATIONS, DORVAL PLANT: Réal Gervais
VICE-PREIDENT, OPERATIONS, MIRABEL PLANT: Alain Dugas

Acquired by Bombardier Inc 23 December, 1986, Bombardier Aerospace Montreal (formerly Canadair) has manufactured more than 4,500 aircraft since 1944. Mirabel plant, adjacent to Montréal International Airport, until recently comprised 27,870 m² (300,000 sq ft) of floor space for manufacture and assembly of the Challenger and Regional Jet. However, 27,870 m² (300,000 sq ft) final assembly building for CRJ700 and CRJ900 formally opened on 22 October 2001, having begun operations in previous August. An 18,580 m² (200,000 sq ft) interior outfitting, flight testing, inspection and delivery centre is also part of the Mirabel facility. Parts, components and spare parts for various aircraft, including Challenger, Regional Jet series, Global Express and Bombardier 415, are manufactured at St Laurent plant, 214,350 m² (2,307,275 sq ft) in Québec. Structural components for other aircraft builders, such as Boeing and Aerospatiale Matra, are also manufactured in this plant.

The Challenger series and Global Express series are completed at the 38,590 m² (415,400 sq ft) Bombardier Completion Center, Montréal, beside the Bombardier Aerospace headquarters at Dorval. Total workforce in the Montréal area is more than 15,000.

BOMBARDIER CRJ200 AND CHALLENGER 800/850

Engineering designation: CL-600-2B19
TYPE: Regional jet airliner.
PROGRAMME: Design studies began in third quarter of 1987; basic configuration frozen June 1988; formal programme go-ahead given 31 March 1989; extended-range CRJ100ER

announced September 1990. Three development aircraft built (c/n 7001–7003), plus static test airframe (c/n 7991) and forward fuselage test article (7992); first flight of 7001 (C-FCRJ) 10 May 1991; 7002 (C-FNRJ) first flew 2 August 1991 and 7003 on 17 November 1991; all three in 1,400-hour flight test programme in Wichita, USA. CF34-3A1 engine obtained its US type certificate 24 July 1991. Transport Canada type approval (CRJ100 and CRJ100ER) 31 July 1992. Japanese Civil Aviation Bureau certification 23 May 2000.

First delivery aircraft (c/n 7004) flew 4 July 1992, and to Lufthansa CityLine of Germany (as D-ARJA) 29 October 1992; European JAA and US FAA certification 14 and 21 January 1993 respectively; long-range CRJ100LR certified 29 April 1994; CRJ200 with CF34-3B1 engines announced in 1995. Replaced CRJ100 after 226 of the latter had been delivered. Total fleet time at August 2004 (not including corporate aircraft) was 8,808,762 flight hours and 7,634,924 cycles, with 99.6 per cent despatch reliability rate. 200th aircraft delivered (to Lufthansa) 24 October 1997; 300th to Atlantic Coast Airlines in April 1999, 400th to Delta Connection/SkyWest in July 2000. 500th to Atlantic Coast Airlines 26 April 2001, and 600th to Atlantic Southeast Airlines 29 January 2002, and 700th to Air Nostrum 30 October 2002, and 1,000th aircraft in CRJ series, a CRJ 700, to Conair on 9 December 2003. Production of CRJ200 running at 9.5 per month in 2000, rising to 12.5 per month by late 2001, and 14.5 per month by 2003, with annual targets of 165 in 2003 and 174 in 2004. Delivery of four CRJ200s in 2006 exhausted orders for 1,021 of short-fuselage CRJs.

CURRENT VERSIONS: **CRJ100:** Original standard aircraft. Engineering designation CL-600-2B19.

- CRJ100ER:** Replaced by CRJ200ER.
- CRJ100LR:** Announced March 1994; launch customer, Lauda Air of Austria; replaced by CRJ200LR.
- CRJ200:** Standard aircraft; designed to carry 50 passengers over 985 n mile (1,824 km; 1,133 mile) range; CF34-3B1 engines with 2.8 per cent lower specific fuel consumption than CF34-3A1 of CRJ100, increasing initial cruise altitude by 213 m (700 ft), cruising speed by 2.5 kt (4.5 km/h; 3 mph), and range typically by 1.5 per cent; Class C baggage compartment as standard. First delivery, to Tyrolean Airways as OE-LCF, 15 January 1996. Further improvements in development for introduction on CRJ200 variants during early 1996 included 3 kt (5.5 km/h; 3.5 mph) reduction in V₂ speed to provide 91 m (300 ft) reduction in T-O run at maximum T-O weight; 1 kt (1.8 km/h; 1.2 mph) reduction in V_{REF} to provide 15 m (50 ft) reduction in landing run at typical landing weights; new 8° flap setting to improve second-segment climb performance; and GPS integrated with an upgraded FMS.
- CRJ200ER:** Extended-range capability with optional increase in maximum T-O weight to 23,133 kg (51,000 lb) and optional additional fuel capacity, for range of 1,645 n miles (3,046 km; 1,893 miles).
- CRJ200LR:** Longer-range version of CRJ200ER (more than 2,005 n miles; 3,713 km; 2,307 miles); maximum T-O weight increased by 907 kg (2,000 lb) to 24,040 kg (53,000 lb).
- CRJ200B, CRJ200B ER and CRJ200B LR:** As above, but with optional hot-and-high CF34-3B1 engines providing normal T-O thrust up to ISA+7.8°C (ISA+6.1°C for standard engines), and APR thrust up to ISA+15°C (ISA+6.1°C for standard engines).
- CRJ440:** Engineering designation CL-600-2B19. Version seating 44 passengers in standard configuration. Launch customer Northwest Airlines has ordered 75.
- CRJ700:** Described separately.

Corporate Jetliner: Company shuttle version with more spacious cabin accommodation for 18 to 30 passengers. One delivered June 1993 to Xerox Corporation. Five ordered by the People's Republic of China in January 1997; operated on behalf of PRC government by China United Airlines' crews; contract value C\$116 million, including outfitting, pilot and maintenance staff training and spares. Supplanted from September 2002 by corporate version of Challenger 800 (see below).

Challenger 800: Corporate version developed in consultation with launch customer TAG Aeronautics Ltd to meet requirement for non-stop flights, London to Jeddah or equivalent, with three crew and five passengers; or between Middle East city pairs with 15 passengers. First flown 26 May 1995 and formally announced at Paris Air Show in the following month; initially designated **Canadair Special Edition**; first delivery (N877SE) to TAG during Dubai International Aerospace Show in November 1995; second TAG aircraft delivered November 1997. Accommodation for up to 19 passengers in customised cabin; additional 1,814 kg (4,000 lb) of fuel carried in two auxiliary tanks behind main cabin, extending range to more than 3,000 n miles (5,556 km; 3,452 miles); maximum T-O weight 24,040 kg (53,000 lb); first aircraft powered by standard CF34-3A1 turbofans, but subsequent examples are equipped with CF34-3B1s increasing range to 3,120 n miles (5,778 km; 3,590 miles); Rockwell Collins Pro Line 4 avionics as on RJ, but with third FMS, third VHF, dual Collins HF and Selcal. Manufactured to special order only. Recent customers include Poly Technologies Inc, which ordered two on 16 August 2001 for operation by China Ocean Aviation Group, with deliveries scheduled for 2002. Renamed Challenger 800 on eve of NBAA Convention at Orlando, Florida, 8 September 2002. Replaced by Challenger 850.

BOMBARDIER AEROSPACE DELIVERIES				
FY (ending 31 January)	Regional	Business	Amphibian	Total
1999–2000	104	183	5	292
2000–01	157	203	10	370
2001–02	206	162	2	370
2002–03	220	77	1	298
2003–04	232	89	3	324
2004–05	200	128	1	329
2005–06	149	186	2	337



One of several elaborately decorated Bombardier CRJ200s serving China Yunnan Airlines 1040562

Challenger 850: Corporate transport based on CRJ200LR: announced 17 May 2005 at EBACE, Geneva, Switzerland. First delivery (C-GSUW, c/n 8047) to Suncor Energy of Alberta 27 March 2006, ex Bombardier. Other conversions by Lufthansa Technik. Range 1,537 n miles (2,846 km; 1,768 miles) with maximum 50 passengers; or 1,920 n miles (3,555 km; 2,209 miles) with split cabin seating eight executives (forward) and 36 staff (rear). Cost USD29 million.

CUSTOMERS: See table. Total 44 deliveries in Bombardier's 2005-06 fiscal year, including eight Challenger 850 corporate shuttles. By 31 October 2006, had received orders for 226 CRJ100s, 709 CRJ200s and 86 CRJ440s, all of which delivered, including four CRJ200s in 2006.

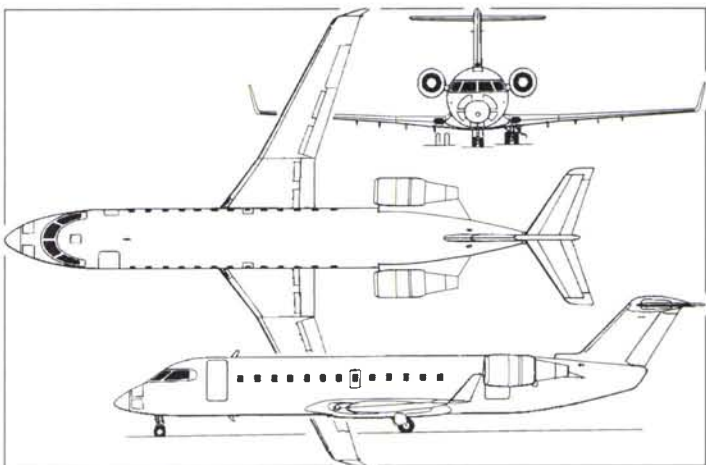
BOMBARDIER CRJ ORDERS AND DELIVERY
(at 31 October 2006)

Customer	Variant	Ordered	Delivered	Backlog
Adria Airways	200	5	5	
Air Canada	100	24	24	
	200	17	17	
	705	15	15	
Air Dolomiti	200	5	5	
Air Littoral	100	19	19	
Air Nostrum	200	35	35	
	900	16	6	10
Air One	900	6	5	1
Air Wisconsin	200	64	64	
American Eagle	701	25	25	
Arik Air	900	2	2	
Atlantic Southeast (ASA)	200	45	45	
	701	12	12	
Atlas Jet	900	3	3	
¹ Austrian arrows	200	13	13	
Brit Air	100	20	20	
	701	12	12	
British European	200	4	4	
China Eastern Yunnan	200	6	6	
Cimber Air	200	2	2	
COMAIR	100	110	110	
	701	20	20	
DAC Air	200	2	2	
Delta Connection	200	94	94	
	701	30	30	
GECAS	200	5	5	
	701	17	17	
GoJet	701	4	4	
Horizon Air	701	20	20	
² Independence Air	200	87	87	
Japan Air Lines (J-AIR)	200	9	9	
Kendell/Ansett	200	12	12	
Lauda Air	100	8	8	
Lufthansa CityLine	100	35	35	
	200	10	10	
	701	20	20	
	900	12	12	
Lufthansa/Eurowings	200	12	12	
Macedonian	900	1	1	
Maersk Air	200	11	11	
	701	5	5	
Malev	200	4	4	
Mesa Air	200	32	32	
	701	20	18	2
	900	40	38	2
Midway	200	24	24	
My Way	900	19	-	19
Northwest Airlines	200	56	56	
	440	86	86	
	900	36	-	36
Saeaga Airlines	200	1	1	
Shandong Airlines	200	5	5	
	701	2	2	
Shanghai Airlines	200	3	3	
SkyWest	100	10	10	
	200	100	100	
	701	57	57	
	900	17	7	10
South African Express	200	6	6	
Southern Winds	200	2	2	
Styrian Spirit	200	1	1	
	701	1	1	
The Fair Inc	200	2	2	
undisclosed	900	1	1	
US Airways	200	35	35	
	701	8	8	
Challenger 800	SE	33	33	
Totals		1,475	1,395	80

¹ Formerly Tyrolean
² Formerly Atlantic Coast Airlines
³ Comprising 26 Series 200 and seven Series 700, of which, all delivered

COSTS: Programme development costs CAD275 million. Atlantic Coast Airlines order for 10 CRJ200ERs valued at USD200 million (September 1998). Order for two Special Editions valued at USD54.2 million (August 2001).

DESIGN FEATURES: Evolved from Challenger (which see), designed expressly for regional airline operating environment. Advanced transonic wing design, with winglets for high-speed operations; fuel-efficient GE turbofans; options include higher design weights, additional fuel capacity, more comprehensive avionics, and maximum certified altitude raised to 12,500 m (41,000 ft).



Bombardier CRJ200 (two General Electric CF34-3B1 turbofans) 1154677

Wings, designed with computational fluid dynamics (CFD), have 13.2 per cent (root) and 10 per cent (tip) thickness/chord ratios, 2° 20' dihedral, 3° 25' root incidence and 24° 45' quarter-chord sweepback.

FLYING CONTROLS: Conventional and power-assisted. Primary controls with cables and push/pull rods for multiple redundancy; hydraulically actuated ailerons, elevators and rudder with at least two hydraulic power control unit actuators per surface (three on rudder and elevator); ailerons and elevators fitted with flutter dampers (dual on elevators); rudder with dual-channel control yaw damping; artificial feel and electric trim for roll and yaw; electronically controlled, variable incidence T tailplane for pitch trim and electronically controlled artificial pitch feel. Double-slotted electromechanical flaps with electronically controlled Datron electric motors; BAE fly-by-wire spoiler and spoileron system, four spoilers each side, with inner two functioning as ground spoilers, outer two comprising one flight spoiler and one spoileron, both also providing lift dumping on touchdown. Avionics suite includes engine indication and crew alerting system (EICAS).

STRUCTURE: Semi-monocoque fuselage is damage tolerant FAR/JAR 25 certified airframe with chemically milled skins; flat pressure bulkheads forward of flight deck and aft of baggage compartment; extensive use of advanced composites in secondary structures (passenger compartment floor, wing/fuselage fairings, nacelle doors, wing access door covers, winglets, tailcone, avionics access doors and landing gear doors); comprehensive anti-corrosion treatment and drainage. Wing is one-piece unit mounted to underside of fuselage; two-spar box joined by ribs, covered top and bottom with integrally stiffened skin panels (three upper and three lower each side) for smooth flow; machined or built-up spars and shearweb-type ribs. Short Brothers (UK) manufactures fuselage central section, fore and aft fuselage plugs, wing flaps, ailerons, spoilerons and inboard spoilers.

LANDING GEAR: Hydraulically retractable tricycle type, manufactured by Dowty. Inward-retracting main units each have 15 in Aircraft Braking System (ABS) wheels with H29x9.0-15 (16 ply) Goodyear tubeless tyres, pressure 11.17 bar (162 lb/sq in) unladen. Nose unit has 18x4.4 (12 ply) tyres (deflector type) and Dowty Canada steer-by-wire steering; unladen tyre pressure 8.62 bar (125 lb/sq in). Aircraft Braking System steel multidisc brakes and fully modulated Hydro Aire Mk III anti-skid system. Minimum taxiway width for 180° turn (with 3.35 m; 11 ft 0 in safety margin) is 22.86 m (75 ft 0 in).

POWER PLANT: Two General Electric CF34-3B1 turbofans, each rated at 41.0 kN (9,220 lb st) with APR and 38.8 kN (8,729 lb st) without. Nacelles produced by Short Brothers. Pneumatically actuated thrust reversers. Fuel in two integral wing tanks, combined capacity 5,300 litres (1,400 US gallons; 1,166 Imp gallons); increaseable to 8,080 litres (2,135 US gallons; 1,778 Imp gallons) with optional centre-wing tank. Pressure refuelling point in starboard leading-edge wingroot; transfer rate 474 litres (125 US gallons; 104 Imp gallons)/min at 3.45 bar (50 lb/sq in); two gravity points on starboard wing (one for centre tank) and one on port wing.

ACCOMMODATION: Two-pilot flight deck; one or two cabin attendants. Main cabin seats up to 50 passengers in standard configuration, four-abreast at 79 cm (31 in) pitch, with centre aisle; maximum capacity 52 seats. Various configurations, from 15 to 50 seats, available for corporate version. Downward-opening front passenger door with integral airstairs on port side; plug-type forward emergency exit/service door opposite on starboard side (inoperative on Challenger 800). Inward-opening baggage door on port side at rear. Overwing Type III emergency exit each side (port side door inoperative on Challenger 800). Entire accommodation pressurised, including rear baggage compartment.

SYSTEMS: Cabin pressurisation and air conditioning system (maximum differential 0.57 bar; 8.3 lb/sq in). Primary flight control systems powered by hydraulic servo-actuators with distinct, alternate paths cable and pushrod systems. Electric trim and dual yaw dampers. Three fully independent 207 bar (3,000 lb/sq in) hydraulic systems. Three-phase 115 V AC electrical primary power at 400 Hz supplied by two 30 kVA engine-driven generators; alternative power provided by APU and air-driven generator. Conversion to 28 V DC by five transformer-rectifier units. Main (Ni/Cd) battery 17 Ah, APU battery 43 Ah. Honeywell GTCP 36-150 (RJ) APU and two-pack air conditioning system in rear of fuselage. Wing leading-edges and engine intake cowls anti-iced by engine bleed air. Electric anti-icing of windscreen and cockpit side windows, pitot heads, air data vanes, static sources and sensors. Ice detection system standard.

AVIONICS: *Comms:* Dual VHF nav/com radios. Options include HF radio, single Selcal and 8.33 kHz VHF.

Radar: Rockwell Collins digital weather radar system; split-scan weather radar and radar with turbulence mode optional.

Flight: Dual flight management systems optional. GPWS, windshear detection system and TCAS. EGPWS optional in place of GPWS. L3 flight data recorder and CNE. Dual FMS 4200 and dual IRS in Corporate Jetliner and Challenger 800.

Instrumentation: Rockwell Collins Pro Line 4 integrated all-digital suite, including dual primary flight displays, dual multifunction displays, dual EICAS, dual AFCS, dual AHRS, dual air data system and Cat. II capability with Cat. IIIa optional using head-up guidance system. Dual inertial reference system optional in lieu of AHRS. Flight Dynamics Inc HGS 2100 HUD approved by Transport Canada November 1995, permitting Cat. IIIa operation.

DIMENSIONS, EXTERNAL: (As for Challenger 604 except):

Wing span over winglets	21.21 m (69 ft 7 in)
Wing chord: at fuselage c/l	5.13 m (16 ft 10 in)
at tip	1.27 m (4 ft 2 in)
Wing aspect ratio (excl winglets)	8.9

Length: overall	26.77 m (87 ft 10 in)
fuselage	24.38 m (80 ft 0 in)
Height overall	6.22 m (20 ft 5 in)
Fuselage max diameter	2.69 m (8 ft 10 in)
Wheel track	3.17 m (10 ft 5 in)
Wheelbase	11.41 m (37 ft 5 in)
Passenger/crew door (fwd, port):	
Height	1.78 m (5 ft 10 in)
Width	0.91 m (3 ft 0 in)
Service door (stbd, fwd): Height	1.22 m (4 ft 0 in)
Width	0.61 m (2 ft 0 in)
Height to sill (crew/service)	1.63 m (5 ft 4 in)
Baggage door (port, rear): Height	1.09 m (3 ft 7 in)
Width	0.84 m (2 ft 9 in)
Height to sill	1.63 m (5 ft 4 in)
Emergency exit (overwing, stbd):	
Height	0.96 m (3 ft 2 in)
Width	0.51 m (1 ft 8 in)
DIMENSIONS, INTERNAL (As for Challenger 604 except):	
Cabin (incl baggage compartment, excl flight deck):	
Length	14.76 m (48 ft 5 in)
Max height	1.85 m (6 ft 1 in)
Width: at centreline: except 800	2.57 m (8 ft 5 in)
800	2.49 m (8 ft 2 in)
at floor level	2.18 m (7 ft 2 in)
Floor area: except 800	32.1 m ² (346 sq ft)
800	30.3 m ² (326 sq ft)
Volume: except 800	57.1 m ³ (2,015 cu ft)
800	53.8 m ³ (1,900 cu ft)
Stowage volume:	
main (rear) baggage compartment	9.0 m ³ (318 cu ft)
wardrobes/bins/underseat (total)	4.7 m ³ (165 cu ft)
AREAS:	
Wings: gross (excl winglets)	54.54 m ² (587.1 sq ft)
net	48.35 m ² (520.4 sq ft)
Ailerons (total)	1.93 m ² (20.8 sq ft)
Trailing-edge flaps (total)	10.60 m ² (114.1 sq ft)
Spoilers (total)	2.26 m ² (24.3 sq ft)
Winglets (total)	1.38 m ² (14.9 sq ft)
Fin	9.18 m ² (98.8 sq ft)
Rudder	2.03 m ² (21.9 sq ft)
Tailplane	9.44 m ² (101.6 sq ft)
Elevators (total)	2.84 m ² (30.52 sq ft)
WEIGHTS AND LOADINGS:	
Manufacturer's weight empty:	
200	13,236 kg (29,180 lb)
200ER, 200LR	13,243 kg (29,195 lb)
800 Corporate	11,703 kg (25,800 lb)
Operating weight empty: 200	13,730 kg (30,270 lb)
200ER, 200LR	13,835 kg (30,500 lb)
800 Corporate	14,424 kg (31,800 lb)
800	15,377 kg (33,900 lb)
Max payload (structural): 200	5,411 kg (11,930 lb)
200ER, 200LR	6,124 kg (13,500 lb)
800 Corporate	5,533 kg (12,200 lb)
800	2,540 kg (5,600 lb)
Max fuel: 200	4,254 kg (9,380 lb)
200ER, 200LR, 800 Corporate	6,489 kg (14,305 lb)
800	8,303 kg (18,305 lb)
Payload with max fuel: 200	3,651 kg (8,050 lb)
200ER	2,923 kg (6,445 lb)
200LR	3,831 kg (8,445 lb)
800 Corporate	2,333 kg (5,145 lb)
800	474 kg (1,045 lb)
Fuel with max payload: 800	6,237 kg (13,750 lb)
Max T-O weight: 200	21,523 kg (47,450 lb)
200ER, 800 Corporate	23,133 kg (51,000 lb)
200LR, 800 Corporate (optional), 800	24,040 kg (53,000 lb)
Max ramp weight: 200	21,636 kg (47,700 lb)
200ER	23,246 kg (51,250 lb)
200LR, 800	24,154 kg (53,250 lb)
Max zero-fuel weight: 800	17,917 kg (39,500 lb)
200	19,141 kg (42,200 lb)
200ER, 200LR, 800 Corporate	19,958 kg (44,000 lb)
Max landing weight: 200	20,275 kg (44,700 lb)
200ER, 200LR, 800 Corporate, 800	21,319 kg (47,000 lb)
Max wing loading: 200	394.6 kg/m ² (80.82 lb/sq ft)
200ER	424.1 kg/m ² (86.87 lb/sq ft)
200LR, 800 Corporate (optional), 800	440.8 kg/m ² (90.27 lb/sq ft)
Max power loading (APR rating):	
200	263 kg/kN (2.57 lb/lb st)
200ER, 800 Corporate	282 kg/kN (2.77 lb/lb st)
200LR, 800 Corporate (optional), 800	293 kg/kN (2.87 lb/lb st)
PERFORMANCE:	
Max operating speed:	
above FL314	M0.85
below FL254	335 kt (621 km/h; 386 mph)
High-speed cruising speed: CRJ200 at FL370	M0.81 or 464 kt (859 km/h; 534 mph)
800 Corporate, 800	M0.80 or 459 kt (850 km/h; 528 mph)
Normal cruising speed: CRJ200 at FL370	M0.74 or 424 kt (785 km/h; 488 mph)
800 Corporate, 800	M0.77 or 442 kt (819 km/h; 509 mph)
Long-range cruising speed: 800 Corporate, 800	M0.74 or 424 kt (785 km/h; 488 mph)
Approach speed, 45° flap, AUV of 19,504 kg (43,000 lb)	135 kt (250 km/h; 155 mph)
Max rate of climb at FL15, 250 kt CAS/M0.74 climb schedule: 200	
200LR	1,128 m (3,700 ft)/min
800	1,036 m (3,400 ft)/min
800	1,034 m (3,395 ft)/min
Max certified altitude	12,500 m (41,000 ft)
FAR T-O field length at S/L, ISA:	
200	1,527 m (5,010 ft)
200ER	1,768 m (5,800 ft)

200LR	1,917 m (6,290 ft)
800 Corporate	1,765 m (5,790 ft)
800	1,918 m (6,295 ft)
FAR landing field length at S/L, ISA, at max landing weight: 200	1,423 m (4,670 ft)
200ER, 200LR	1,478 m (4,850 ft)
800 Corporate, SE	887 m (2,910 ft)
Range with max payload at long-range cruising speed, FAR Pt 121 reserves:	
200	965 n miles (1,787 km; 1,110 miles)
200ER	1,645 n miles (3,046 km; 1,893 miles)
200LR	2,005 n miles (3,713 km; 2,307 miles)
Corporate (30 seats), NBAA IFR reserves	2,017 n miles (3,735 km; 2,321 miles)
800 with 3,674 kg (8,100 lb) payload	1,541 n miles (2,853 km; 1,773 miles)
Range with max fuel:	
800 Corporate	2,250 n miles (4,167 km; 2,589 miles)
800	3,120 n miles (5,778 km; 3,590 miles)
OPERATIONAL NOISE LEVELS (CRJ200, FAR Pt 36):	
CRJ200: T-O	77.6 EPNdB
Approach	92.1 EPNdB
Sideline	82.4 EPNdB
800 Corporate, 800: T-O	78.7 EPNdB
Approach	92.1 EPNdB
Sideline	82.2 EPNdB

BOMBARDIER CRJ700 and CHALLENGER 870

Engineering designation: CL-600-2C10

TYPE: Regional jet airliner.

PROGRAMME: Design and market evaluation began in 1995 in consultation with 15-member advisory panel of airline operators; stretched derivative of Regional Jet; originally designated CRJ-X. GE CF34-8C1 engines selected February 1995; low-speed wind tunnel testing began early 1995 at Institute of Aeronautical Research, Ottawa; high-speed wind tunnel testing began November 1995 at Rockwell facilities in California. More than 650 hours of wind tunnel testing completed by September 1996. Bombardier Board gave approval for launch on 21 January 1997, at which time orders included four from launch customer Brit Air of France. Aerodynamic configuration frozen 14 March 1997; design frozen 17 July 1998. New version of CF34 engine first ground run in February 1998, followed by flight tests on GE-owned Boeing 747 testbed in first quarter of 1999 and certification in November 1999. First flight (C-FRJX c/n 10001) 27 May 1999; official roll-out 28 May 1999; public debut (c/n 10004) at Farnborough International Air Show 23 July 2000; Transport Canada certification achieved 22 December 2000; first delivery, to Brit Air of France, in February 2001, followed by deliveries to Horizon Air and Lufthansa CityLine in May.

Four flying aircraft and two static test airframes participated in the certification programme; one static test airframe was used for Complete Aircraft Static Test (CAST), while the other underwent Durability and Damage Tolerance Test (DDTT), and was subjected to the equivalent of 160,000 flight cycles. Test programme was conducted at the Bombardier Flight Test Centre at Wichita, Kansas, totalling 1,600 flight hours on four aircraft: C-FRJX (handling and performance evaluation), 10002/C-FJFC (systems), 10003/C-FBKA (avionics) and 10004/C-FCRJ, the first to be fully furnished (function and reliability testing), which initially flew on 16 December 1999. In December 2002 Bombardier signed a tentative agreement with China Aviation Corporation 1 (AVIC 1) that could lead to final assembly of the CRJ700 and CRJ900 by Shanghai Aviation Industrial Corporation.

Total fleet time, including CRJ900s, at March 2005 stood at 893,760 hours and 697,473 cycles, with a 99.2 per cent despatch reliability rate.

CURRENT VERSIONS: **CRJ700 Srs 701:** Formerly CRJ700 68-seat version in standard and extended range (ER) weight options. *As described.*

CRJ700 Srs 705: Formerly CRJ701, 70-seat version in standard, extended range (ER) and long range (LR) weight options. *Described separately.*

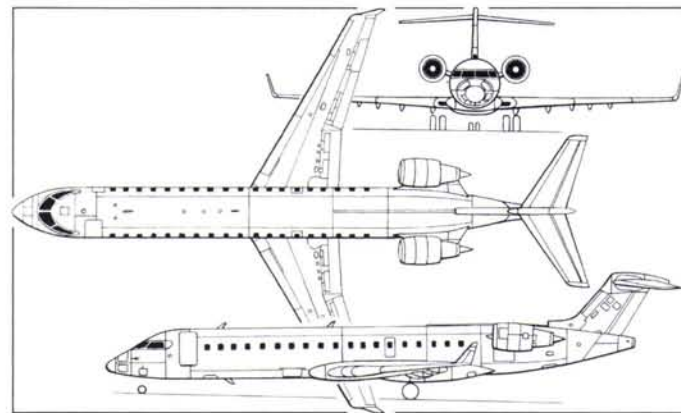
Challenger 870: Corporate shuttle version of CRJ700 Srs 701. Three delivered in 2004-05 and three in 2005-06.

CRJ900: Further stretch, *described separately.*

CUSTOMERS: Refer to table in CRJ200 entry. By 31 October 2006 had gained 268 (251 CRJ701 and 15 CRJ705) orders, of which 266 (251 CRJ701 and 15 CRJ705) had then been delivered. Deliveries of CRJ700 and 900 variants in Bombardier's 2005-06 fiscal year totalled 77, including three Challenger 870 corporate shuttles. At 31 October 2006, only two aircraft remained to be delivered from 253 CRJ700s (excluding Srs 705).

COSTS: Development cost CAD645 million, of which CAD440 million provided by Bombardier and balance by risk-sharing partners. Unit cost USD26.8 million (1998). Break-even point is at 200th of 400 aircraft production run.

DESIGN FEATURES: Commonality (including crew training and type rating) with CRJ100/200; direct operating cost per seat-mile to be 20 per cent lower than that of CRJ100/200 and lowest of any airliner in its class. Fuselage stretched 4.72 m (15 ft 6 in) by plugs fore and aft of centre-section to seat 70 passengers; rear pressure bulkhead moved aft by 1.29 m (4 ft 3 in); cabin 6.02 m (19 ft 9 in) longer; APU moved to tailcone; cabin floor lowered by 2.5 cm (1 in) and ceiling raised by 1.3 cm (½ in) to provide 1.89 m (6 ft 2¼ in) headroom;



Bombardier CRJ700 series regional jet airliner (James Goulding)

1158940



Bombardier CRJ700 70-seat regional airliner

1040566

cabin windows raised 11.5 cm (4½ in); new underfloor baggage compartment, volume 3.09 m³ (109 cu ft) to facilitate ramp check-in; wing span increased by 1.83 m (6 ft 0 in) by wingroot plug; wing leading-edge extended and equipped with high-lift devices; larger horizontal tail surfaces; new pitch control system; main landing gear lengthened; new wheels, tyres, brakes; air conditioning and anti-icing systems upgraded; new engines; new underfloor baggage compartment on forward port side; overhead stowage bins redesigned.

Incorporation of CRJ900's strengthened wing and avionics software upgrades under consideration in mid-2001 to increase commonality between CRJ700 and CRJ900, affording a 200 n mile (370 km; 230 mile) increase in range for CRJ700.

FLYING CONTROLS: Sextant and Menasco primary and secondary flight control system; flying controls are actuated via a dual network of cables, pulleys and pushrods which operate hydraulic power drive units; secondary controls are fly-by-wire.

STRUCTURE: Programme participants include Bombardier Canadair operations (wing, cockpit, rudder and doors, electrical system, primary flight controls, plus final assembly and interior completion), C & D Interiors (cabin interior), Gamesa (vertical and horizontal stabilisers), General Electric (power plant), GKN Westland (tailcone and doors), Hella Aerospace GmbH (lighting system), Honeywell (APU), Inter technique (fuel system), Liebherr Aerospace Toulouse (air management system), Menasco Aerospace (landing gear), Mitsubishi Heavy Industries (aft fuselage), Parker Abex (hydraulic system), Rockwell Collins (avionics), Sextant Avionique (flight control system), Shorts (nacelles and thrust reversers) and Hamilton Sundstrand (flaps, leading-edge slats and electrical system).

LANDING GEAR: Hydraulically retractable tricycle type by Menasco with twin wheels on each unit. Mainwheel tyre size H36x12.0-18, pressure 10.55 bar (153 lb/sq in); nosewheel tyre size H20.5x6.75-10, pressure 9.24 bar (134 lb/sq in).

POWER PLANT: Two General Electric CF34-8C1 turbofans with dual-channel FADEC. Engine rating 56.4 kN (12,670 lb st), or 61.3 kN (13,790 lb st) with automatic power reserve, flat rated to ISA + 15°C. Inter technique fuel management system with Ratier-Figeac controls. Fuel capacity 10,989 litres (2,903 US gallons; 2,417 Imp gallons).

ACCOMMODATION: Two-pilot flight deck. Main cabin seats 70 passengers, four abreast at 79 cm (31 in) pitch. Baggage compartment and lavatory at rear of cabin; underfloor baggage compartment; various combinations of galleys, wardrobes and lavatory at front of cabin according to seating capacity. Passenger door, forward emergency exit/service door, overwing emergency exits and baggage door as for Regional Jet.

SYSTEMS: Hamilton Sundstrand electrical generation system comprising two 40 kVA integrated drive generators; tailcone-mounted Honeywell APU approved for operation up to 12,500 m (41,000 ft); Liebherr air management system; Inter technique fuel system; Walter Kidde fire detection system; Goodrich potable water system; Hella lighting system; Parker/Abex Hydraulics hydraulic systems, and Teleflex anti-icing system.

AVIONICS: Radar; Rockwell Collins digital weather radar.

Flight: Rockwell Collins AHRS and TCAS.

Instrumentation: Rockwell Collins Pro Line 4 EFIS with six 127 × 178 mm (5 × 7 in) CRT displays, including dual PFD, dual MFD and dual EICAS; Flight Dynamics HGS 2000 head-up guidance system. Autopilot, FMS and centralised avionics maintenance functions are provided by integrated avionics processing system (IAPS). Windshear detection and recovery system standard. Equipped for Cat. II landings.

Following data are provisional.

DIMENSIONS, EXTERNAL:

Wing span	23.24 m (76 ft 3 in)
Wing aspect ratio	7.4
Length overall	32.51 m (106 ft 8 in)
Max diameter of fuselage	2.69 m (8 ft 10 in)
Height overall	7.57 m (24 ft 10 in)
Tailplane span	8.53 m (28 ft 0 in)
Wheelbase	13.67 m (44 ft 10 in)
Turning circle	22.86 m (75 ft 0 in)
Passenger door (port, fwd):	
Height	1.78 m (5 ft 10 in)
Width	0.91 m (3 ft 0 in)
Height to sill	1.73 m (5 ft 8 in)
Baggage door (port, aft): Height	0.84 m (2 ft 9 in)
Width	1.09 m (3 ft 7 in)
Height to sill	2.31 m (7 ft 7 in)
Baggage door (port, fwd): Height	0.51 m (1 ft 8 in)
Width	1.07 m (3 ft 6 in)
Height to sill	1.28 m (4 ft 2½ in)
Service door (starboard, fwd): Height	1.22 m (4 ft 0 in)
Width	0.61 m (2 ft 0 in)
Height to sill	1.73 m (5 ft 8 in)

DIMENSIONS, INTERNAL:

Cabin (excl flight deck):	
Length	18.03 m (59 ft 2 in)
Max width: at centreline	2.57 m (8 ft 5 in)
at floor level	2.13 m (7 ft 0 in)
Max height	1.89 m (6 ft 2¼ in)
Floor area, excl cockpit	38.46 m ² (414 sq ft)
Volume	75.95 m ³ (2,682 cu ft)
Baggage volume (total)	23.3 m ³ (824 cu ft)

AREAS:

Wings, net	68.63 m ² (738.7 sq ft)
------------	------------------------------------

Horizontal tail surfaces (total)	20.74 m ² (223.3 sq ft)
Vertical tail surfaces (total)	13.36 m ² (143.8 sq ft)

WEIGHTS AND LOADINGS:

Operating weight empty	19,731 kg (43,500 lb)
Max payload	8,528 kg (18,800 lb)
Payload with max fuel: standard	4,364 kg (9,620 lb)
ER	5,384 kg (11,870 lb)
Max fuel weight	8,822 kg (19,450 lb)
Max T-O weight: standard	32,999 kg (72,750 lb)
ER	34,019 kg (75,000 lb)
Max ramp weight: standard	33,112 kg (73,000 lb)
ER	34,132 kg (75,250 lb)
Max landing weight	30,390 kg (67,000 lb)
Max zero-fuel weight	28,259 kg (62,300 lb)
Max wing loading: standard	480.8 kg/m ² (98.48 lb/sq ft)
ER	495.7 kg/m ² (101.53 lb/sq ft)
Max power loading: standard	293 kg/kN (2.87 lb/lb st)
ER	302 kg/kN (2.96 lb/lb st)

PERFORMANCE:

Cruising Mach No.:	
high speed	0.825 (470 kt; 870 km/h; 541 mph)
normal	0.78 (444 kt; 822 km/h; 511 mph)
Max certified altitude	12,500 m (41,000 ft)
T-O field length at S/L, ISA:	
standard	1,564 m (5,130 ft)
ER	1,676 m (5,500 ft)
Landing field length at S/L, ISA, at max landing weight:	
standard and ER	1,551 m (5,090 ft)
Range, 70 passengers, at M0.77, IFR reserves:	
standard	1,649 n miles (3,053 km; 1,897 miles)
ER	1,946 n miles (3,604 km; 2,239 miles)

OPERATIONAL NOISE LEVELS (FAR Pt 36):

T-O at max T-O weight	82.7 EPNdB
Approach at max landing weight	92.6 EPNdB
Sideline	89.4 EPNdB

BOMBARDIER CRJ700 SERIES 705

TYPE: Regional jet airliner.

PROGRAMME: Launch customer, Air Canada Jazz, placed order on 27 September 2004. Canadian type certificate issued 3 May 2005. First aircraft C-GJAZ (c/n 15036 - 36th CRJ900 fuselage) delivered to Air Canada Jazz, 27 May 2005, followed by service entry on 1 June 2005 on Calgary, Alberta, to Houston, Texas, route.

CUSTOMERS: See table under CRJ200 entry. By late 2005, all 15 ordered (all for Air Canada) had been delivered.

DESIGN FEATURES: Essentially is CRJ900 certified for reduced number of 75 passengers.

POWER PLANT: Two General Electric CF34-8C5 turbofans, each rated at 58.4 kN (13,123 lb st), or 64.5 kN (14,510 lb st) with automatic power reserve. CF-34-8C5A1 engines optional.

ACCOMMODATION: Main cabin seats 75 passengers, four abreast, with central aisle. Jazz seating for 10 executive class passengers at 94 cm (37 in) pitch and 65 economy at 87 cm (34 in).

Data generally as for CRJ900; specific data follow:

WEIGHTS AND LOADINGS:

Basic operating weight: all	21,432 kg (47,250 lb)
Max fuel weight	8,822 kg (19,450 lb)
Max T-O weight: 705	36,514 kg (80,500 lb)
705 ER	37,421 kg (82,500 lb)
705 LR	38,328 kg (84,500 lb)
Max landing weight: 705, 705 ER	33,339 kg (73,500 lb)
705 LR	34,019 kg (75,000 lb)
Max ramp weight: 705	36,628 kg (80,750 lb)
705 ER	37,535 kg (82,750 lb)
705 LR	38,555 kg (85,000 lb)
Max zero-fuel weight: 705, 705 ER	31,751 kg (70,000 lb)
705 LR	32,023 kg (70,600 lb)
Max wing loading: 705	517.2 kg/m ² (105.92 lb/sq ft)
705 ER	530.0 kg/m ² (108.55 lb/sq ft)
705 LR	542.8 kg/m ² (111.18 lb/sq ft)
Max power loading: 705	313 kg/kN (3.07 lb/lb st)
705 ER	320 kg/kN (3.14 lb/lb st)
705 LR	328 kg/kN (3.22 lb/lb st)

PERFORMANCE:

T-O field length at S/L, ISA, max T-O weight:	
705	1,779 m (5,835 ft)
705 ER	1,860 m (6,105 ft)
705 LR	1,944 m (6,380 ft)
Landing field length at S/L, max landing weight:	
705, 705 ER	1,596 m (5,235 ft)
705 LR	1,623 m (5,325 ft)



Bombardier CRJ700 Series 705 75-seat twin-jet

1040533

Max range with 75 passengers at long range cruising speed:	
705	1,939 n miles (3,591 km; 2,231 miles)
705 ER, 705 LR	2,037 n miles (3,772 km; 2,344 miles)
OPERATIONAL NOISE LEVELS, 705 LR:	
T-O	83.9 EPNdB
Approach	92.4 EPNdB
Sideline	89.1 EPNdB

BOMBARDIER CRJ900

Engineering designation: CL-600-2D24

TYPE: Regional jet airliner.

PROGRAMME: Announced October 1999; stretched derivative of CRJ700; wind tunnel testing began November 1999; partner/supplier selection finalised second quarter 2000; interior mockup completed March 2000; formal launch at Farnborough International Air Show 24 July 2000; prototype, modified from CRJ700 prototype C-FRJX, with fuselage plugs but retaining CRJ700 wings, landing gear and engines, first flown 21 February 2001; public debut at Paris Air Show 14 June 2001; first production aircraft, c/n 15001/C-GRNH, first flown 20 October 2001; Transport Canada certification achieved 9 September 2002, followed by FAA approval 25 October 2002 and JAA certification 23 December 2002; first customer delivery (c/n 15002) to Mesa Air on 3 February 2003, followed by service entry on 26 April.

In December 2002 Bombardier signed a tentative agreement with China Aviation Industry Corporation I (AVIC I) that could lead to final assembly of the CRJ700 and CRJ900 by Shanghai Aviation Industries Group.

CURRENT VERSIONS: 900: Standard version.

900ER: Extended-range version.

900ER European: As 900ER but with maximum T-O weight limited to 36,995 kg (81,560 lb) to minimise weight-related charges when operating in European airspace.

900LR: Long-range version.

900LR European: As 900LR but with maximum T-O weight limited to 37,995 kg (83,764 lb).

Challenger 890: Corporate shuttle version of CRJ900.

900X: Proposed in 2006 as 2.95 m (9 ft 8 in) stretch, increasing passenger capacity to between 89 and 100. Launch conditional on orders, although MyAir contract for 19 CRJ900s includes option to convert 15 to 900X; Atlasjet showing interest. Deliveries 24 to 36 months after go-ahead.

CUSTOMERS: Total 153 ordered and 75 delivered by 31 October 2006. Estimated market for 800 aircraft in CRJ900 class over 20-year period.

COSTS: Development cost CAD200 million; unit cost CAD30 million (2002).

DESIGN FEATURES: Compared to CRJ700, has fuselage stretched — by means of 2.29 m (7 ft 6 in) plug forward of centre-section and 1.57 m (5 ft 2 in) plug aft of centre-section — to accommodate 86 to 90 passengers in four-abreast configuration with fore and aft lavatories; 5 to 10 per cent higher thrust engines; strengthened main landing gear with upgraded wheels and brakes; strengthened wing; two additional overwing emergency exits; increased volume in forward underfloor baggage hold, and an additional underfloor baggage door and aft service door on starboard side. Common crew qualification with CRJ200/700 series.

STRUCTURE: Programme partners as for CRJ700. Final assembly and completion by Bombardier at new CRJ700/900 facility at Montréal-Mirabel Airport.

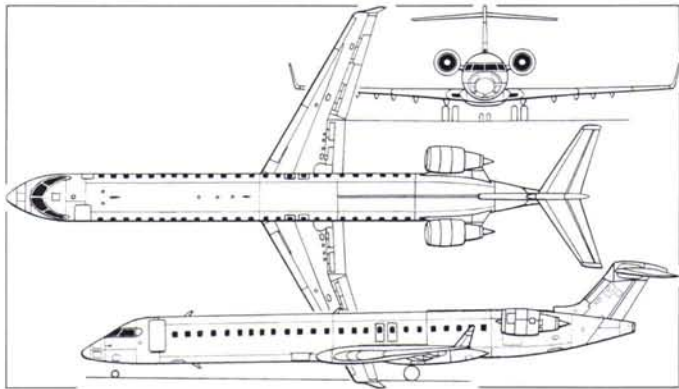
LANDING GEAR: As for CRJ700.

POWER PLANT: Two General Electric CF34-8C5 turbofans. Engine rating 58.4 kN (13,123 lb st) or 63.4 kN (14,255 lb st) with automatic power reserve, flat rated to ISA + 15°C. Fuel capacity 10,989 litres (2,903 US gallons; 2,417 Imp gallons).

ACCOMMODATION: Standard dual-class accommodation for 86 passengers in four-abreast configuration at 79 cm (31 in) seat pitch with fore and aft lavatories and forward galley; alternative configurations include high density with accommodation for 90 passengers at 79 cm (31 in) seat pitch, dual-class with 15 business class seats three-abreast at 86 cm (34 in) seat pitch in forward section and 60 economy class four-abreast at 79 cm (31 in) seat pitch at rear, and dual class with 55 business class seats in four-abreast configuration at 84 cm (33 in) seat pitch in forward section and 24 economy class at 79 cm (31 in) seat pitch at rear. Standard additional floor beam facilitates offset seat rail for three-abreast seating throughout cabin.

SYSTEMS: Honeywell RE220 APU.

AVONICS: As for CRJ700.



Bombardier CRJ900 (James Goulding)

1158939

DIMENSIONS, EXTERNAL (As for CRJ700 Srs 701 except):

Wing span	24.84 m (81 ft 6 in)
Wing aspect ratio	9.0
Length overall	36.37 m (119 ft 4 in)
Height overall	7.49 m (24 ft 7 in)
Wheelbase	14.73 m (48 ft 4 in)
Aft service door (stbd):	
Height	1.22 m (4 ft 0 in)
Width	0.61 m (2 ft 0 in)
Height to sill	2.39 m (7 ft 10 in)
Emergency exits (four, overwing):	
Height	0.91 m (3 ft 0 in)
Width	0.51 m (1 ft 8 in)

DIMENSIONS, INTERNAL:

Cabin (excl flight deck):	
Length	21.92 m (71 ft 11 in)
Floor area, excl cockpit	46.73 m ² (503 sq ft)
Baggage volume: checked	16.81 m ³ (593.5 cu ft)
total	25.57 m ³ (903 cu ft)

AREAS:

Wings, gross	68.63 m ² (738.7 sq ft)
--------------------	------------------------------------

WEIGHTS AND LOADINGS:

Operating weight empty	21,432 kg (47,250 lb)
Max payload	10,319 kg (22,750 lb)
Payload with max fuel: 900	6,178 kg (13,620 lb)
900ER	6,972 kg (15,370 lb)
Max fuel weight	8,822 kg (19,450 lb)
Max T-O weight: 900	36,514 kg (80,500 lb)
900ER	37,421 kg (82,500 lb)
900ER European	36,995 kg (81,560 lb)
900LR	38,328 kg (84,500 lb)
900LR European	39,808 kg (87,763 lb)
Max ramp weight: 900	36,627 kg (80,750 lb)
900ER	37,535 kg (82,750 lb)
900LR	38,442 kg (84,750 lb)
Max landing weight	33,339 kg (73,500 lb)
Max zero-fuel weight	31,751 kg (70,000 lb)
Max wing loading: 900	532.1 kg/m ² (108.98 lb/sq ft)
900ER	545.3 kg/m ² (111.68 lb/sq ft)
900ER European	539.1 kg/m ² (110.41 lb/sq ft)
900LR	558.5 kg/m ² (114.39 lb/sq ft)
900LR European	580.1 kg/m ² (118.81 lb/sq ft)



Lufthansa CityLine Bombardier CRJ900

1040539

Max power loading: 900	313 kg/kN (3.07 lb/lb st)
900ER	320 kg/kN (3.14 lb/lb st)
900ER European	317 kg/kN (3.11 lb/lb st)
900LR	328 kg/kN (3.22 lb/lb st)
900LR European	325 kg/kN (3.19 lb/lb st)
PERFORMANCE:	
Cruising Mach No:	
high speed	0.83 (476 kt; 882 km/h; 548 mph)
for max range	0.80 (458 kt; 848 km/h; 527 mph)
Max certified altitude: 900, 900ER	12,500 m (41,000 ft)
Service ceiling, OEI: 900	4,968 m (16,300 ft)
900ER	4,755 m (15,600 ft)
FAR T-O field length:	
900	1,779 m (5,835 ft)
900ER	1,861 m (6,105 ft)
900LR	1,945 m (6,380 ft)
FAR landing field length at S/L, ISA, at max landing weight:	
900, 900ER	1,596 m (5,235 ft)
900LR	1,623 m (5,325 ft)
Range, 86 passengers, at M0.77:	
900	1,596 n miles (2,955 km; 1,836 miles)
900ER	1,840 n miles (3,407 km; 2,117 miles)
900LR	1,976 n miles (3,659 km; 2,273 miles)
OPERATIONAL NOISE LEVELS (FAR Pt 36):	
T-O	84.2 EPNdB
Approach	93.2 EPNdB
Sideline	89.6 EPNdB

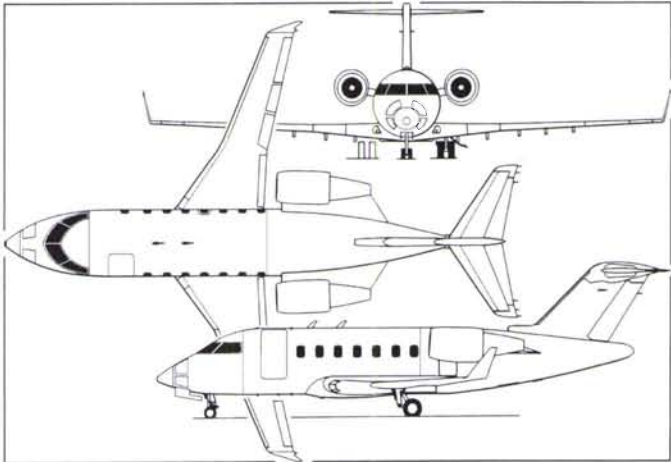
BOMBARDIER BD-100 CHALLENGER 300

Engineering designation: BD-100-1A10
TYPE: Business jet.
PROGRAMME: Design study, then known as 'Bombardier Model 70', revealed at the Paris Air Show in June 1997; formally announced at NBAA Convention at Las Vegas 18 October 1998; launched at Paris Air Show 13 June 1999; initially named Continental; first metal cut 21 October 1999 following completion of joint definition phase; HTF-7000 (formerly AS907) engine first flown 29 January 2000, engine certification achieved 25 June 2002; wing/fuselage mating of first aircraft achieved 19 November 2000; first flight (c/n 20001/C-GJCJ) from the Bombardier Flight Test Center at Wichita's Mid-Continent Airport 14 August 2001, followed by second aircraft (c/n 20002/C-GJCF) on 9 October. These and three further aircraft (c/n 20003/C-GIPX, dedicated to avionics test and flown 6 December 2001; c/n 20004/C-GJCV for systems testing and the first to be fully outfitted with standard interior, flew 5 April 2002; and c/n 20005/C-GJPZ, for function and reliability testing including cabin systems), originally due to fly in May 2002 but delayed until 8 March 2003; participated in the flight test and certification programme culminating in Transport Canada 525 approval, FAA FAR Pt 25 and JAA JAR 25 certification, with RVSM approval, FAR Pt 36 Stage 3 noise compliance. Transport Canada certification achieved 31 May 2003, followed by FAA approval on 4 June 2003 and JAA certification on 31 July 2003, first delivery (N505FX c/n 20006) to Bombardier Business Jet Solutions (Flexjet) 23 December 2003; first revenue flight 8 January 2004. First corporate operator delivery (c/n 20010/N41DP) 15 April 2004, to Dean Phillips Inc.
Public debut at NBAA Convention, New Orleans, 11 December 2001 (formal presentation 12 December). European debut (C-GJCV) at EBACE 2003 at Geneva 5 May 2003. Re-named Challenger 300 on 8 September 2002, immediately prior to NBAA Convention at Orlando, Florida.
CUSTOMERS: Two orders signed at time of launch, by customers in Germany and United Arab Emirates; total of 125 firm orders received by 5 May 2003, including 25 for Bombardier's Flexjet fractional ownership programme, 15 for European customers and five for its Middle East and Arab nations distributor TAG Aeronautics. Total of 28 delivered in 2004, 50 in 2005 and 54 in 2006. Bombardier anticipates gaining 30 per cent of estimated 1,200-aircraft market in this class by 2012, with fractional ownership operations especially targeted.
COSTS: Development cost C\$AD500 million (1998); break-even estimated at 300th aircraft. Unit cost USD19.21 million typically equipped (2006). Direct operating cost estimated at USD1,969 per hour (2006).
DESIGN FEATURES: Design goals included coast-to-coast range across USA with eight passengers in cabin with stand-up headroom and take-off field length less than 1,525 m



Bombardier Challenger 300 cabin interior

1040578



Bombardier Challenger 300 (Paul Jackson)

1158936

(5,000 ft). General configuration is as shown in the accompanying illustrations; supercritical wing with winglets, sweepback 27° at quarter-chord.
FLYING CONTROLS: Conventional. Ailerons manually actuated via cables, pulleys and pushrods, each with a geared tab and fixed tab, plus trim tab on port aileron only; maximum aileron deflections ±18°. Horn-balanced elevators, maximum deflections +24°/-18°, and single rudder panel, maximum deflection ±30°, hydraulically actuated by cables and pulleys with manual reversion, each with dual PCUs; variable incidence tailplane for pitch trim, maximum travel +2°/-12°. Hydraulically actuated Fowler flaps, maximum deflection 30°; each wing has two segment multifunction spoiler outboard, maximum deflection 45°, and two-segment ground spoiler/lift dumper inboard, maximum deflection 60°; yaw damper standard.



Bombardier Challenger 300 (Paul Jackson)

1153779

For details of the latest updates to *Jane's All the World's Aircraft* online and to discover the additional information available exclusively to online subscribers please visit jawa.janes.com

STRUCTURE: Primarily light alloy, with composites for some non-structural fairings; fuselage of semi-monocoque construction with frames and stringers; two-spar wing; three-spar fin. Programme suppliers include: AIDC Taiwan (rear fuselage and tail unit); Canadair (cockpit, forward fuselage and primary flight controls); Fischer Austria (cabin interior) ECE (electrical system and cockpit lighting); Fischer Austria (wing-to-fuselage fairings); GKN Westland (engine nacelles); Goodrich (wheels and brakes); Hawker de Havilland Australia (tailcone and APU installation kit); Hella (lighting); Honeywell (power plant and APU); Hurel-Dubois (thrust reversers); Inter technique (fuel system); Liebherr Aerospace-Toulouse (environmental control and anti-icing systems); Liebherr Aerospace Lindenberg (flap control system); Messier-Dowty (landing gear); Mitsubishi Heavy Industries (wing); Moog (secondary flight controls); NLX (flight training device and level C/D flight simulator); Parker Aerospace (hydraulic system); PPG Industries (cockpit windscreens and cabin windows); Rockwell Collins (avionics); Scott Aviation (oxygen system); Shorts (centre fuselage), and Walter Kidde (fire detection and suppression system). Final assembly with interior completion is at Bombardier's facility in Dorval Quebec.

LANDING GEAR: Hydraulically retractable tricycle type by Messier-Dowty, with two wheels on each unit; trailing-link-type main units retract inwards, nosewheel forwards. Steerable nosewheel, maximum deflection $\pm 65^\circ$. Mainwheel tyre size 26.5x8.0-18, nosewheel tyre size 18x5.5-10. Goodrich carbon composites multiple disc brakes. Turning radius 17.68 m (58 ft 0 in).

POWER PLANT: Two Honeywell HTF7000 (formerly AS907) turbofans with FADEC, each with thermodynamic rating of 35.81 kN (8,050 lb st), flat-rated to 30.4 kN (6,826 lb st) with APR at ISA+15°C. All fuel contained in two integral wing tanks, combined capacity 7,934 litres (2,096 US gallons; 1,745 Imp gallons). Oil capacity both engines, 10.40 litres (2.75 US gallons; 2.29 Imp gallons). Gravity fuelling point in top of each wing, near leading-edge, plus single-point pressure refuelling/defuelling port in starboard wingroot near leading-edge. Target-type reversers standard.

ACCOMMODATION: Two crew flight deck; cabin, with flat floor, accommodates eight passengers in standard 'double club' arrangement on tracking, swivelling and reclining 16 g seats with retractable headrests, cabin management controls, cupholders and shoulder harnesses; three-seat 16 g take-off and landing-certified divan with extending backrest optional as interchange for two club seats. Standard cabin equipment includes fold-out work tables; one 110 V electrical outlet per club seat group; hot drinks dispensers; DVD/CD player, integrated i-pod with hi-fi trim panel speakers and two 508 mm (20 in) flat screen monitors; Airshow 400 system; ICG Iridium in-flight telephone with two handsets and switchover locations; extended-life LED lighting; forward galley with microwave oven; forward passenger wardrobe and crew coat closet; aft lavatory and vanity unit with hot and cold water and removable waste tank, and flight-accessible baggage compartment. Free-fall opening/power-assisted-closure, semi-plug-type airstair cabin door, on port side immediately aft of flight deck, also serves as Type I emergency exit; single plug-type overwing Type III emergency exit on starboard side, between rearmost pair of club seats. External baggage door aft of port wing trailing-edge. Cabin and baggage compartment pressurised, air-conditioned and heated.

SYSTEMS: Two independent phosphate-ester hydraulic systems with one engine-driven pump and one DC motor pump per system, pressure 207 bar (3,000 lb/sq in), plus one auxiliary system powered by an accumulator. Pressurisation system, differential 0.60 bar (8.78 lb/sq in), with auxiliary system providing pressurisation up to 10,670 m (35,000 ft). 28 V DC electrical system comprises three 400 Ah DC brushless generators (one each on the engines and one on the APU) and two 24 V 44 Ah Ni/Cd batteries which provide power for APU starting, in-flight emergency power and ground power. APU generator can carry load of a failed engine generator, and one battery can supply power for APU starting. Oxygen system, capacity to suit customer requirements, with demand-type masks for crew and drop-down masks for passengers.

Engine bleed air automatically controlled anti-icing for wing leading-edges and nacelle lips; electrically anti-iced windscreen; heated angle-of-attack vanes and pitot probes. Honeywell tailcone-mounted RE220 APU, with FADEC, will be certified for operation up to 11,280 m (37,000 ft) and in-flight starting to 9,150 m (30,000 ft).

AVIONICS: Rockwell Collins Pro Line 21 as core system.

Comms: Dual VHF com with 8.33 kHz frequency spacing capability; dual integrated radio control and display units; dual transponders, and ELT with NAV all standard. Dual HF com, and VHF/satcom datalink capability with Selcal optional.

Radar: Dual-scan digital weather radar with optional turbulence detection.

Flight: Standard equipment includes dual ILS/VOR/markers, AHRS and air data computers; single ADF, DME, FMS/CDU, GPS sensor, EGPWS, TCAS II, EICAS, radio altimeter, CVR and flight deck aural warning system. Second ADF, three-dimensional flight plan maps, FDR and lightning sensor optional.

Instrumentation: EFIS with four 305 x 254 mm (12 x 10 in) colour LCDs providing PFD and MFD functions for pilot and co-pilot.

DIMENSIONS, EXTERNAL:

Wing span over winglets	19.46 m (63 ft 10 in)
Length overall	20.92 m (68 ft 7½ in)
Height overall	6.20 m (20 ft 4 in)
Fuselage max diameter	2.34 m (7 ft 8 in)
Tailplane span	7.23 m (23 ft 8½ in)
Wheel track	3.20 m (10 ft 6 in)
Wheelbase	8.46 m (27 ft 9 in)
Passenger door: Height	1.89 m (6 ft 2½ in)
Width	0.76 m (2 ft 6 in)
Baggage door: Height	0.76 m (2 ft 6 in)
Width	0.61 m (2 ft 0 in)
Height to sill	1.63 m (5 ft 4 in)
Emergency exit: Height	0.91 m (3 ft 0 in)
Width	0.51 m (1 ft 8 in)

DIMENSIONS, INTERNAL:

Cabin (excl cockpit):	
Length	8.72 m (28 ft 7¼ in)
Width: at centreline	2.19 m (7 ft 2¼ in)
at floor	1.55 m (5 ft 1 in)
Max height	1.85 m (6 ft 1 in)
Floor area	13.5 m² (146 sq ft)
Volume	24.35 m³ (860 cu ft)
Baggage compartment volume	2.99 m³ (105.50 cu ft)

AREAS:

Wings, net	48.49 m² (522.0 sq ft)
Ailerons, total	0.93 m² (10.00 sq ft)
Trailing-edge flaps, total	7.56 m² (81.40 sq ft)
Spoilers, total	3.55 m² (38.26 sq ft)
Rudder, incl tabs	1.89 m² (20.40 sq ft)
Tailplane	11.39 m² (122.55 sq ft)
Elevators	4.22 m² (45.40 sq ft)

WEIGHTS AND LOADINGS:

Operating weight empty	10,659 kg (23,500 lb)
Payload: max	1,588 kg (3,500 lb)
with max fuel	612 kg (1,350 lb)
Fuel weight: max	6,418 kg (14,150 lb)
with max payload	5,443 kg (12,000 lb)
Max T-O weight	17,622 kg (38,850 lb)
Max ramp weight	17,690 kg (39,000 lb)
Max landing weight	15,308 kg (33,750 lb)
Max zero-fuel weight	12,247 kg (27,000 lb)
Max wing loading	363.4 kg/m² (74.43 lb/sq ft)
Max power loading	290 kg/kN (2.85 lb/lb st)

PERFORMANCE:

Max level speed	476 kt (882 km/h; 548 mph)
Max operating speed:	
S/L to FL80	300 kt (556 km/h; 345 mph)
FL80 to 8,984 m (29,475 ft)	320 kt (593 km/h; 368 mph)
Above 8,984 m (29,475 ft)	M0.83
High cruising speed	M0.82 or 470 kt (870 km/h; 541 mph)
Normal cruising speed	M0.80 or 459 kt (850 km/h; 528 mph)
Max rate of climb at S/L	1,097 m (3,600 ft)/min
Rate of climb at S/L, OEI	205 m (673 ft)/min
Initial cruising altitude	12,500 m (41,000 ft)
Max certified altitude	13,715 m (45,000 ft)
T-O balanced field length	1,466 m (4,810 ft)
Landing run at max landing weight	792 m (2,600 ft)
Range with eight passengers, NBAA IFR reserves	3,100 n miles (5,741 km; 3,567 miles)

BOMBARDIER CL-600 CHALLENGER

Canadian Forces designations: CC-144, CC-144B and CE-144A

Engineering designation: CL-600-2B16

TYPE: Business jet.

PROGRAMME:

DEVELOPMENT MILESTONES

Challenger 600	
First flight	8 Nov 78
Certification	10 Aug 80
First flight, production	21 Sep 79
First delivery	30 Dec 80
Subsequent versions	
Challenger 601	
First flight	10 Apr 82
First flight, production	17 Sep 82
Certification	25 Feb 83
First delivery	6 May 83
Challenger 604	
First flight	18 Sep 94
Certification	20 Sep 95

First flight of prototype (C-GCGR-X) 8 November 1978; first flight production Challenger 600 with AlliedSignal ALF 502L-2 turbofans 21 September 1979; first customer delivery 30 December 1980; first flight Challenger 601 with GE CF34s 10 April 1982; first 601-1A delivered 6 May 1983; first 601-3A 6 May 1987 and first 601-3A/ER 19 May 1989; first 601-3R 14 July 1993; first 604 25 January 1996. Challenger certified for operation in 40 countries by 1998. By 28 February 2003 the Challenger fleet had flown 2.36 million hours, with a despatch reliability in excess of 99.7 per cent. 500th Challenger rolled out 'green' 25 May 2000 and handed over (as N816CC) 1 September 2000; 600th for customer delivery (c/n 5557) delivered for completion 6 February 2003 and (as C-GAWH) formally handed over to Clearwater Fine Foods of Nova Scotia at NBAA Convention, Orlando, Florida, on 8 October 2003.

CURRENT VERSIONS: Challenger 600: Total 84 (excluding one prototype) built (76 since retrofitted with winglets); 12 delivered to Canadian Department of National Defence as CC-144 (three) and CE-144A (three), plus three for coastal patrol, two for general transport and one test aircraft. Production completed with final delivery on 22 June 1983.

Challenger 601-1A: First production version to have CF34 engines; first flight 17 September 1982. Deliveries (66, including four CC-144Bs) between 6 May 1983 and 29 May 1987.

Challenger 601-3A: Version with 'glass' cockpit and CF34-3A engines; first flight 28 September 1986; Canadian and US certification 21 and 30 April 1987; also certified for Cat. II and in 22 other countries; improvements include CF34-3A engines flat rated to 21°C, and fully integrated digital flight guidance and flight management systems. Total of 134 delivered between 6 May 1987 and 29 October 1993.

Challenger 601-3R: Extended-range option available on new 601-3As since 1989 (c/n 5135 and onwards) and as retrofit to 601-1As and 601-3As; range increased to 3,585 n miles (6,639 km; 4,125 miles) with NBAA IFR reserves; first flight 8 November 1988; Canadian certification 16 March 1989; tail fairing replaced with conformal tailcone fuel tank which extends fuselage length by 46 cm (1 ft 6 in) and adds 118 kg (260 lb) to operating weight empty; maximum ramp weight increased by 680 kg (1,500 lb). Optional gross weight increase of 227 kg (500 lb). Total of 92 modification kits supplied between March 1989 and October 1993. Challenger 601-3ER, incorporating extended-range modifications, CF34-3A1 engines and 20,457 kg (45,100 lb) max T-O weight, was standard production version from 14 July 1993 (first delivery); last of 59 new-build aircraft delivered by early 1996.

Challenger 604: Prototype (C-FTBZ) modified on the production line from a Challenger 601-3R; engineering designation CL-600-2B16; first flight (with CF34-3A engines) 18 September 1994; first flight with definitive CF34-3B engines 17 March 1995. Exploits systems developed in Regional Jet programme. Rockwell Collins Pro Line 4 EFIS; extra 1,242 litres (328 US gallons; 273 Imp gallons) of fuel in aft equipment bay, forward fuselage tank and tail tank. Automatic aft-CG control to reduce trim drag for longer range. New landing gear, carbon brakes and anti-skid system; strengthened tail unit; new wing-to-fuselage and underbelly fairings. Transport Canada certification achieved 20 September 1995.

From June 2001, Challenger 604s have been delivered with upgraded PrecisionPlus Collins Pro Line 4 avionics, intended to reduce pilot workload and make the aircraft more compatible with future air traffic environments. Standard PrecisionPlus features include



First flight of Bombardier Challenger 605 on 22 January 2006

1154398



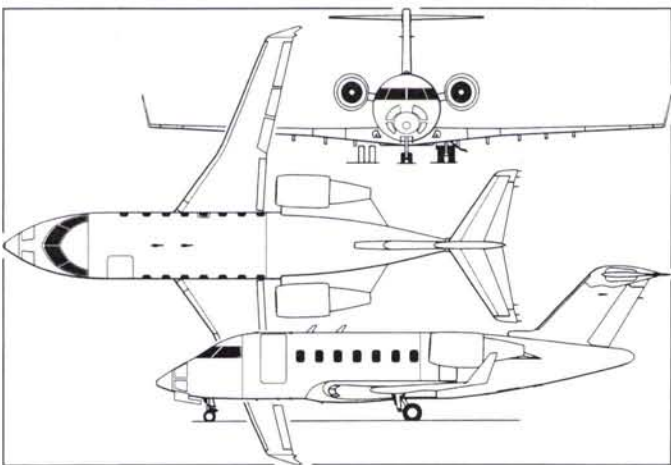
Bombardier Challenger 605 prototype landing after its maiden flight

1154397



Bombardier Challenger 604 business jet (Paul Jackson)

1153780



Bombardier Challenger 605 (Paul Jackson)

1158937

automatic look-up and display of take-off, approach, landing and missed-approach speeds, eliminating the need to refer to manual charts; automatic look-up and display of thrust setting (N_1) for take-off, climb, cruise and go-around; blending of actual observed wind and entered wind to improve the prediction of flight time and fuel requirements; position reporting in non-radar environments such as the North Atlantic; improved polar navigation, enabling the crew to navigate and steer the aircraft at latitudes over 89°; full-time DME reporting on the pilot's MFD; EICAS improvements including the addition of metric fuel indication capability, logic enhancements and FMS performance enhancements; and full integration with the Flight Dynamics HUD and Safe Flight AutoPower autothrottle system. Optional features include flight plan map feature providing an intuitive, three-dimensional graphic representation of the programmed flight plan and predicted flight path for the pilot's and co-pilot's MFDs; long-range cruise feature allowing pilots to select a cruise speed computed by the FMS for either maximum range or maximum speed; search pattern feature

offering automatic generation of waypoints; and expanded FDR to meet FAA FAR Pt 135.152 requirements. The PrecisionPlus avionics upgrade is also available for retrofit to earlier Challenger 604s.

Max-Viz EVS-1000 enhanced vision system received FAA certification on 13 March 2003 for installation on Challengers.

Detailed description applies to Challenger 604.

Challenger 605: Announced at the NBAA Convention in Orlando, 8 November 2005, when a full-size cabin mockup was displayed. Features include conical (replacing wedge-shape) rear fuselage; 91 kg (200 lb) reduction in basic operating weight compared with the Challenger 604 despite standard inclusion of 10 items previously optional; Collins Pro Line 21 avionics with four vertical format 305 × 254 mm (12 × 10 in) LCD screens, increasing display area by over 55% compared to Challenger 604's six smaller CRT screens; Collins integrated flight information system (IFIS) with electronic chart capability 'paperless' operation and a class 3 EFB; Thales solid-state integrated standby instrument system; restyled cabin interior providing more headroom and volume; enlarged and relocated cabin windows which increase natural lighting; LED cabin lighting; new galley design with increased storage capacity; on-demand audio/video and optional; high-speed Internet connectivity. Performance and weights generally as for Challenger 604, except operating weight empty of 12,240 kg (26,985 lb) and slight range increase to 4,045 n miles (7,491 km; 4,654 miles). First flight C-FGYM (c/n 5701) 22 January 2006, followed by Transport Canada certification on 5 October 2006, Federal Aviation Administration certification on 20 October 2006, and European Aviation Safety Agency certification on 24 October 2006. The Challenger 605 was scheduled for first deliveries in third quarter of 2007.

Special Missions: One Challenger 604 delivered in late 2000 to (South) Korean National Maritime Police with unspecified sensor and communications suite. First of three maritime surveillance 604s entered service with Royal Danish Air Force in late 2002 although first flight with full modifications (ventral radome and retractable EO sensor installed by Field Aviation) not achieved until 28 February 2003.

CUSTOMERS: See under individual headings in Current Versions. Total more than 680 Challengers of all versions delivered (including to completion centres) by January 2006, including 340 Challenger 604s. Annual deliveries have included 33 in 1997, 36 in 1998, 40 in 1999, 38 in 2000, 41 in 2001, 31 in 2002, 24 in 2003, 29 in 2004, 36 in 2005 and 23 in the first nine months of 2006.

COSTS: Unit cost (605), USD26.714 million, typically equipped (2006).

DESIGN FEATURES: Advanced wing section; quarter-chord sweep 25°; thickness/chord ratio 14 per cent at root, 12 per cent at leading-edge sweep break and 10 per cent at tip; dihedral 2° 33'; incidence at root 3° 30'; fuselage circular cross-section, pressurised.

FLYING CONTROLS: Conventional, fully powered hydraulic controls; electrically actuated variable incidence tailplane; two-segment spoilers (outboard airbrake panels, inboard lift dumpers); two-segment double-slotted flaps.

STRUCTURE: Two-spar wing torsion box; chemically milled fuselage skin panels with riveted frames and stringers form damage-tolerant structure; multispar fin and tailplane.

LANDING GEAR: Hydraulically retractable tricycle type, with twin wheels and Dowty oleo-pneumatic shock-absorber on each unit. Mainwheels retract inward into wing centre-section, nose unit steerable and self-centring. Mainwheels have H27×8.5-14 (16 ply) tubeless tyres, pressure 12.07 bar (175 lb/sq in); nosewheels have Goodrich 18×4.4 (12 ply) tubeless (deflector-type) tyres, pressure 10.00 bar (145 lb/sq in). ABS (Aircraft Braking Systems) hydraulically operated multiple-disc carbon brakes with fully modulated anti-skid system. Minimum ground turning radius 12.19 m (40 ft 0 in).

POWER PLANT: Two General Electric CF34-3B1 turbofans, each rated at 41.0 kN (9,220 lb st) with automatic power reserve, or 38.8 kN (8,729 lb st) without APR, pylon-mounted on rear fuselage and fitted with cascade-type fan-air thrust reversers. Nacelles and thrust reversers by Shorts. Integral fuel tank in centre-section, capacity 2,839 litres (750 US gallons; 624 Imp gallons), one in each wing (each 2,725 litres; 720 US gallons; 600 Imp gallons) and auxiliary tanks (combined capacity 1,181 litres; 312 US gallons; 260 Imp gallons) beneath cabin floor. Saddle tanks, total capacity 999 litres (264 US gallons; 220 Imp gallons); tank in tailcone, capacity 745 litres (197 US gallons; 164 Imp gallons). Total fuel capacity 11,214 litres (2,963 US gallons; 2,468 Imp gallons). Pressure and gravity fuelling and defuelling. Oil capacity 13.6 litres (3.6 US gallons; 3.0 Imp gallons).

ACCOMMODATION: Two-pilot flight deck with dual controls. Blind-flying instrumentation standard. Cabin interiors to customer's specifications; maximum of 19 passenger seats and three crew approved. Typical installations include lavatory, buffet, bar and wardrobe. Medevac version can carry up to seven stretcher patients, infant incubator, full complement of medical staff and comprehensive intensive care equipment. Baggage compartment, with own loading door, accessible in flight. Downward-opening, power-assisted door on port side, forward of wing. Overwing emergency exit on starboard side. Entire accommodation heated, pressurised and air conditioned. Optional extended cabin interior increases cabin length by 0.51 m (1 ft 8 in) and provides two additional cabin windows by removing rear

closet and moving the lavatory and baggage compartment bulkheads, with corresponding 0.20 m³ (7 cu ft) reductions in baggage capacity. Ultra Electronics active noise vibration control (ANVC) system optional.

SYSTEMS: Honeywell pressurisation and air conditioning systems, maximum pressure differential 0.63 bar (9.1 lb/sq in). Three independent hydraulic systems, each of 207 bar (3,000 lb/sq in). No. 1 system powers flight controls (via servo-actuators positioned by cables and pushrods); No. 2 system for flight controls and brakes; No. 3 system for flight controls, landing gear extension/retraction, brakes and nosewheel steering. Nos. 1 and 2 systems each powered by an engine-driven pump, supplemented by an AC electric pump; No. 3 system by two AC pumps. Two 30 kVA engine-driven generators supply primary 115/200 V three-phase AC electric power at 400 Hz. Four transformer-rectifiers to convert AC power to 28 V DC; one primary 24 V 17 Ah Ni/Cd battery and one auxiliary 24 V 43 Ah battery. Alternative primary power provided by APU and/or an air-driven generator, latter deployed automatically in flight if engine-driven generators and APU are inoperative. Stall warning system, with stick shakers and stick pusher. Honeywell GTCF 35-150 (CL) gas-turbine APU for engine start, ground air conditioning and other services. Electric anti-icing of windscreen, flight deck side windows and pitot heads; Hamilton Sundstrand bleed air anti-icing of wing leading-edges, engine intake cowls and guide vanes. Gaseous oxygen system, pressure 127.5 bar (1,850 lb/sq in). Continuous-element fire detectors in each engine nacelle, APU and main landing gear bays; two-shot extinguishing system for engines, single-shot system for APU.

AVIONICS: Rockwell Collins Pro Line 21.

Comms: Dual VHF; dual ATC transponders; dual HF; cockpit voice recorder.

Radar: Rockwell Collins TWR-850 colour digital weather radar with turbulence detection.

Flight: Dual VHF nav with provision for third; dual DME; dual ADF; dual Honeywell laseref V laser inertial reference systems (LIRS) with full provision for third; dual flight management system with provision for third; digital automatic flight control system, with dual-channel autopilot and flight director; Mach trim and auto trim; dual digital air data system. Space provisions for flight data recorder, ELT, dual GPS, EGPWS, AFIS, TCAS II and Safe Flight Instrument Corporation AutoPower enhanced autothrottle system.

Instrumentation: Rockwell Collins digital avionics include Pro Line 21 four-display EFIS with 305 × 254 mm (12 × 10 in) LCD displays which include two-tube EICAS display (MFD); standby instruments (artificial horizon, airspeed indicator, compass and altimeter). Systems certified for Cat. II operations.

EQUIPMENT (Medevac version): Includes cardiopulmonary resuscitation unit; physio control life pack comprising heart defibrillator, ECG and cardioscope; ophthalmoscope; respirators and resuscitators; infant monitor; X-ray viewer; cardiostimulator; foetal heart monitor; and anti-shock suit.

DIMENSIONS. EXTERNAL:

Wing span over winglets	19.61 m (64 ft 4 in)
Wing chord: at root	3.99 m (13 ft 1 in)
at tip	1.27 m (4 ft 2 in)
Wing aspect ratio (excl winglets)	8.0
Length overall	20.85 m (68 ft 5 in)
Fuselage: Length	18.77 m (61 ft 7 in)
Max diameter	2.69 m (8 ft 10 in)
Height overall	6.30 m (20 ft 8 in)
Tailplane span	6.20 m (20 ft 4 in)
Wheel track (c/l of shock-struts)	3.18 m (10 ft 5 in)
Wheelbase	7.99 m (26 ft 2½ in)
Passenger door (port, fwd): Height	1.78 m (5 ft 10 in)
Width	0.94 m (3 ft 1 in)
Height to sill	1.63 m (5 ft 4 in)
Baggage door (port, rear): Height	0.84 m (2 ft 9 in)
Width	0.71 m (2 ft 4 in)
Height to sill	1.73 m (5 ft 8 in)
Overwing emergency exit (stbd):	
Height	0.91 m (3 ft 0 in)
Width	0.51 m (1 ft 8 in)

DIMENSIONS. INTERNAL:

Cabin: Length, incl galley, lavatory and baggage area, excl flight deck	8.66 m (28 ft 5 in)
Max width	2.49 m (8 ft 2 in)
Width at floor level	2.18 m (7 ft 2 in)
Max height	1.85 m (6 ft 1 in)
Floor area	18.8 m² (202 sq ft)
Volume	32.6 m³ (1,150 cu ft)

AREAS:

Wings, gross (excl winglets)	48.31 m² (520.0 sq ft)
Ailerons (total)	1.39 m² (15.0 sq ft)
Trailing-edge flaps (total)	7.80 m² (84.0 sq ft)
Fin	9.18 m² (98.8 sq ft)
Rudder	2.03 m² (21.9 sq ft)
Tailplane	6.45 m² (69.4 sq ft)
Elevators (total)	2.15 m² (23.1 sq ft)

WEIGHTS AND LOADINGS:

Weight empty	11,759 kg (25,923 lb)
Operating weight empty	12,240 kg (26,985 lb)
Max fuel weight	9,072 kg (20,000 lb)
Max payload	2,275 kg (5,015 lb)
Payload with max fuel	596 kg (1,315 lb)
Fuel with max payload	7,394 kg (16,300 lb)
Max T-O weight	21,863 kg (48,200 lb)
Max ramp weight	21,908 kg (48,300 lb)
Max landing weight	17,236 kg (38,000 lb)
Max zero-fuel weight	14,515 kg (32,000 lb)
Max wing loading	452.6 kg/m² (92.69 lb/sq ft)
Max power loading	267 kg/kN (2.61 lb/lb st)

PERFORMANCE (at standard max T-O weight, except where indicated):

Cruising speed: max	M0.82 (470 kt; 870 km/h; 541 mph)
normal cruising speed	M0.80 (459 kt; 851 km/h; 529 mph)
long-range cruising speed	M0.74 (425 kt; 787 km/h; 489 mph)
Time to initial cruising altitude	22 min
Initial cruising altitude	11,460 m (37,600 ft)
Max certified altitude	12,500 m (41,000 ft)
Service ceiling, OEI: at mid-cruise weight 17,373 kg (38,300 lb)	6,920 m (22,700 ft)
at max T-O weight	5,170 m (16,960 ft)
Balanced T-O field length (ISA at S/L)	1,780 m (5,840 ft)
Landing distance at S/L at max landing weight	846 m (2,777 ft)

Range with max fuel and five passengers, NBAA IFR reserves:

long-range cruising speed	4,027 n miles (7,458 km; 4,634 miles)
normal cruising speed	3,714 n miles (6,878 km; 4,274 miles)
Design g limit	+2.5

OPERATIONAL NOISE LEVELS:

T-O	81.2 EPNdB
Sideline	86.2 EPNdB
Approach	90.3 EPNdB

BOMBARDIER BD-700 GLOBAL EXPRESS

Engineering designation: BD-700-1A10

TYPE: Long-range business jet.

PROGRAMME:

DEVELOPMENT MILESTONES

Announced	28 Oct 91
Rolled out	26 Aug 96
First flight	13 Oct 96
Public debut	Nov 96
Certification	31 Jul 98
First delivery	8 Jul 99

Announced 28 October 1991 at NBAA Convention; full-scale cabin mockup exhibited at NBAA Convention September 1992; conceptual design started early 1993. Programme launched 20 December 1993; high-speed configuration frozen June 1994; low-speed configuration established August 1994.

Ground test programme using static test airframe c/n 0001 began August 1996; prototype C-FBGX (engineering designation BD-700-1A10) rolled out 26 August 1996; first flight 13 October 1996; public debut at NBAA Convention at Orlando, Florida, November 1996; prototype and three other aircraft undertook 2,000-hour, 18-month flight test programme based at Bombardier's flight test centre in Wichita, Kansas; second aircraft, (C-FHGX), which is used for systems evaluation and testing, flew 3 February 1997, third (C-FJGX), which is used for avionics and autopilot testing, 22 April 1997; fourth (C-FKGX), first flown 8 September 1997 and the first to be fully outfitted, was used for function and reliability testing.

Transport Canada certification 31 July 1998; FAA certification 13 November 1998; JAA certification 7 May 1999; German LBA certification 26 May 1999; first customer delivery of completed aircraft 8 July 1999 to AirFlite Inc of Long Beach, California, which operates the aircraft on behalf of Toyota Motor Sales USA; 50th 'green' airframe delivered to Montréal completion centre 7 June 2000. Transport Canada and JAA RVSM approval granted 16 January 2001, followed by FAA RVSM approval on 29 January. Thales Avionics head-up flight display system (HFDS) achieved Transport Canada certification on 14 September 2001 and FAA approval on 4 October 2001. Following exploratory discussions with potential suppliers, in-house development of Bombardier Enhanced Vision System (BEVS) began in 2002 and received Transport Canada certification 11 August 2005, followed by FAA approval on 26 August and EASA approval on 16 September 2005. At 28 February 2003 total fleet time stood at 73,000 flying hours with a despatch rate of 99.25 per cent. 100th aircraft (c/n 9100/NISA) delivered 18 December 2002 to Stanford Financial Group of Houston, Texas.

CURRENT VERSIONS: *Global Express:* As described.

Global Express XRS: Improved version, announced at NBAA Convention in Orlando, Florida, 6 October 2003. Prototype C-FCOI (c/n 9159) first flew 16 January 2005. Design goals include increased range at high speed, improved take-off performance and new fast-refuelling technology. Additional forward fuselage tank in wing/fuselage fairing adds 674 kg (1,486 lb) of usable fuel; zero-flap take-off capability enhances hot-and-high performance with increased fuel load; software upgrades to the fuel computer, coupled with structural changes, reduce refuelling time by 15 minutes. Bombardier enhanced vision system (BEVS) is standard. Increased pressure differential maintains a 1,372 m (4,500 ft) cabin environment at FL450, and 1,737 m (5,700 ft) environment at FL510; upgraded humidification system optional. Cabin features two additional windows (forward starboard, opposite door; and rear port; adjacent to flaps), providing 40 per cent more natural light in forward vestibule area; redesigned floor plan with full galley on port side; 12-hour non-stop-flight-approved crew area with overhead storage on starboard side; 0.42 m³ (15 cu ft) of additional aft storage volume; increased overhead stowage in crew area; and standard forward and aft vacuum lavatories; integrated cabin system diagnostic tool to manage environmental system including temperature, lighting, water and waste systems; Goodrich-Hella-designed LED mood lighting; and Rockwell Collins Airshow 21 integrated cabin electronics including DVD/CD/MP3 players, optional satellite TV and standard digital airborne wireless local area network (LAN) with cabin telephone system and multichannel satcoms with Inmarsat Aero H+. Swift64 and Iridium communication services interfaces.

First two customer aircraft delivered from completion centre on 25 November 2005 and 6 December 2005 respectively, last named entering service on 10 December 2005 with OJSC AK Transneft oil company. Unit cost USD45.5 million, typically equipped (2003).

Sentinel R. Mk 1: Ground surveillance version for UK; prime contractor Raytheon Systems of USA.

Sentinel AGS: Airborne ground surveillance. The Global Express has been chosen as the airborne platform for the Raytheon-led Co-operative Transatlantic AGS Solution (CTAS) bid for the NATO Alliance Ground Surveillance (AGS) system, for which a development contract was expected to be awarded in December 2004. If selected, the AGS-modified Global Express would have reduced service ceiling and range compared with the business jet, estimated at 13,715 m (45,000 ft) and 5,000 n miles (9,260 km; 5,754 miles), respectively.

CUSTOMERS: 150th aircraft entered service on 26 August 2005. Recent customers include Qatar Airways which ordered two, with two options, on 8 December 2003, for delivery in mid- and late 2004. Estimated market for 500 to 800 long-range business jets over 15 years; Bombardier anticipates capturing 50 per cent of the market, breaking even at approximately 100; target production rate 34 per year; total of 35 delivered in 2000, 21 in 2001, 16 in 2002, 17 in 2003, 20 in 2004, 13 in 2005 and 17 in the first nine months of 2006.

COSTS: Development costs CAD800 million; half carried by Bombardier, balance by risk-sharing partners. Unit cost USD45.5 million (XRS, 2005).

DESIGN FEATURES: Design goal was longest possible range at highest speed from short runway with 99.5 per cent despatch reliability; wide-body fuselage, combining Challenger cabin cross-section with cabin length of Regional Jet; all-new, 'third-generation supercritical' wings with leading-edge slats and winglets.

Wing sweep 35° at quarter-chord, thickness/chord ratio 11 per cent, dihedral 2° 30', root incidence 2° 30'. Wing, high-lift devices and wing/fuselage interface and area-ruled rear fuselage/engine pylon junction contours developed with extensive use of computational fluid dynamics (CFD). Rear-mounted engines. Sweptback T tail with 38° sweep and 5° anhedral on tailplane, 45° sweep on fin.



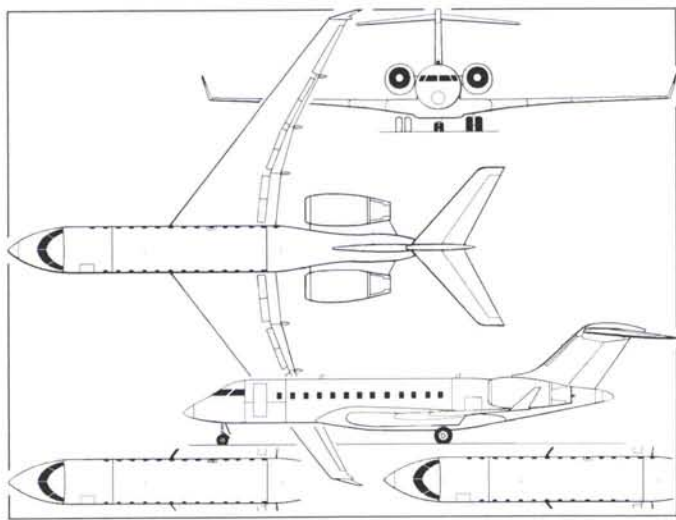
Bombardier Global Express (Paul Jackson)

1153781



Impression of Global Express AGS, offered to NATO

0548618



Bombardier BD-700 Global Express with maximum option of 15 standard cabin windows, plus scrap views of (left) standard cabin glazing and (right) Global Express XRS (Paul Jackson)

1158938

FLYING CONTROLS: Conventional and mechanical. Fully powered primary flying controls with variable artificial feel and emergency back-up via ram air turbine following triple hydraulic failure; dual sidestick controllers; duplicated cable runs with automatic disconnect in the event of control surface jamming; dual power control units on ailerons (maximum deflections $+26.5/-23^\circ$) and elevators (maximum deflections $+24/-19^\circ$), triple units on rudder (maximum deflection 37° left/right), Eight-section (total) leading-edge slats (maximum deflection 20°) and six-section (total) single-slotted Fowler flaps (maximum deflection 30°) are signalled by dual electronic control units and operated by dual-motor power units connected by rigid driveshafts to ball-screw actuators. Electrically signalled, hydraulically actuated multifunction spoilers (four per side, outboard, operating differentially to assist ailerons and improve roll response, and symmetrically for speed brake or lift dump functions) and ground spoilers (two per side, inboard), maximum deflection $+40^\circ$. Horizontal stabiliser incidence adjustable for pitch trim ($+13/-2^\circ$) via dual-channel electrically driven screw actuator; roll trim accomplished by electric trim actuator located at aileron feel simulator unit; yaw trim accomplished by electric trim actuator at summing unit in fin. Dual yaw damper stability augmentation system and stick shaker/pusher stall protection system standard.

STRUCTURE: Semi-monocoque fuselage with chemically milled C-188 Al aluminium alloy skin riveted over alloy frames and stringers to form damage-tolerant structure; main two-spar torsion box wing structure mostly of alloy construction, with machined alloy spars and ribs and polyurethane-coated machined alloy skin panels; two-spar winglets of mixed alloy/composites construction; multispar fin is alloy; ailerons, flaps, spoilers, rudder, two-spar tailplane, elevators, wing/fuselage fairings, flap track fairings, main landing gear bay, upper and lower engine nacelle doors and cabin floor panels are of composites construction.

Bombardier's Canadair division is design authority and manufactures nose section; de Havilland manufactures rear fuselage, engine pylons and vertical stabiliser and is responsible for final assembly at Downsview; Mitsubishi supplies wings and centre fuselage; Short Brothers designed and manufactures forward fuselage, engine nacelles, horizontal stabiliser and other composites components; Bombardier is responsible for interior completions at its Montréal facility. Other participants in the programme are Honeywell Aerospace (APU), Anetek Aerospace (data acquisition unit, engine vibration monitoring system, fuel flow transmitters and engine thermocouples), Rolls-Royce Deutschland (power plant), Hella (lighting systems), Honeywell (avionics), Liebherr-Aerospace Toulouse (air management system), Lucas Aerospace (electrical systems),

Messier-Dowty International (landing gear), Parker Bertea Aerospace (flight controls and fuel and hydraulic systems), Raytheon E-Systems (pitch feel systems), Thales Avionics (flight control system) and Hamilton Sundstrand (slat/flap actuation system and ram air turbine).

LANDING GEAR: Hydraulically retractable tricycle type with Messier-Dowty oleo-pneumatic shock-absorber and twin wheels on each unit; main units retract inward into wing, nosewheel forwards. Goodyear tyres, mainwheels tyre size H38x12.0-19 (20 ply) tubeless, maximum pressure 11.45 bar (166 lb/sq in); nosewheel tyres 21x7.25-10 (12 ply) tubeless (deflector-type), maximum pressure 9.93 bar (144 lb/sq in). Carbon brakes with dual Goodrich/HydroAire hydraulic digital brake-by-wire/modulated anti-skid system providing pilot-selectable, three-level autobrake capability. Steerable nosewheel, maximum steering angle $\pm 75^\circ$; minimum ground turning radius 20.73 m (68 ft 0 in).

POWER PLANT: Two rear-mounted 65.6 kN (14,750 lb st) Rolls-Royce Deutschland BR710A2-20 turboprops, flat rated to ISA + 20°C , with FADEC. International Nacelle Systems (Shorts/Hurel-Dubois joint venture) hydraulically actuated two-petal target-type thrust reversers.

Fuel contained in two integral wing tanks, each of 8,415 litres (2,223 US gallons; 1,851 Imp gallons) capacity, centre-section tank, capacity 6,227 litres (1,645 US gallons; 1,370 Imp gallons), and auxiliary tank in aft fuselage, capacity 1,276 litres (337 US gallons; 281 Imp gallons), giving total standard capacity of 24,333 litres (6,428 US gallons; 5,353 Imp gallons). On aircraft incorporating Service Bulletin 700-28-40, capacities are: wing tanks (each) 8,437 litres (2,229 US gallons; 1,856 Imp gallons); centre-section tank 7,113 litres (1,879 US gallons; 1,565 Imp gallons), and auxiliary tank 1,276 litres (337 US gallons; 281 Imp gallons) for a total of 25,265 litres (6,674 US gallons; 5,557 Imp gallons). Fuel from centre-section and auxiliary tanks is transferred to wing tanks from where two AC main pumps and DC back-up pump feed to engines; automatic fuel management system balances quantities in port and starboard wing tanks. Gravity and pressure refuelling: single-point pressure fuelling/defuelling coupling in starboard wing/fuselage fairing. Oil capacity 20 litres (5.3 US gallons; 4.4 Imp gallons) with oil replenishment tank, capacity 5.7 litres (1.5 US gallons; 1.2 Imp gallons) permitting remote oil servicing from the cockpit.

ACCOMMODATION: Crew of three or four (including cabin attendant) and eight to 19 passengers depending on interior fit. Customised cabin interior according to customer requirements. Typical arrangement comprises three-compartment cabin with lavatory at rear, crew area, galley, small lavatory and wardrobe forward, and standard 'office in the sky', stateroom and conference area. Flight-accessible baggage compartment at rear of cabin with external plug-type door forward of port engine intake. Accommodation is heated, air conditioned and pressurised; predicted cabin noise level 52 dB. Thirteen windows on port side of cabin; standard 13 to starboard, with option of up to two extra windows, one forward, one rear (for totals of 13, 14 or 15), each 40 cm (1 ft 3 3/4 in) high x 27.4 cm (10 3/4 in) wide; one window over wing on starboard side doubles as plug-type emergency exit. Electrically operated airstair door at front of cabin on port side.

SYSTEMS: Integrated air management system by Liebherr-Aerospace Toulouse provides engine bleed, wing anti-ice, air conditioning, cabin pressurisation and avionics ventilation. Digitally controlled dual cooling pack system with ozone converters and bleed air filters provides cabin air circulation at standard rate 1.81 m³ (64 cu ft)/min/person, maximum rate 2.29 m³ (81 cu ft)/min/person with crew-selectable 100 per cent fresh air or recirculation and three air sources for cabin pressure control: maximum pressure differential 0.66 bar (9.64 lb/sq in) maintains a 1,525 m (5,000 ft) cabin altitude to 12,500 m (41,000 ft) and a 2,200 m (7,220 ft) cabin altitude to maximum operating altitude of 15,545 m (51,000 ft). Engine bleed air anti-icing for wing leading-edge fixed surfaces and slats; tail surfaces unprotected; bleed management system automatically switches between low- and high-pressure compressor air to improve engine efficiency. Oxygen system comprises four 1,417 litre (50 cu ft) oxygen cylinders pressurised to 127.6 bar (1,850 lb/sq in) for passenger and crew use.

Lucas/Leach electrical power generation and distribution system comprises two 40 kVA variable frequency generators on each engine, supplying primary 115/200 V three-phase AC electrical power at 324 to 596 Hz; alternative AC power provided by 45 kVA APU-mounted generator and emergency power by 9 kVA air-driven generator, the latter automatically deployed in the event of power loss; electrical management system automatically performs priority-based load-shedding and reconfiguration in event of failure. Four 150 A TRUs convert AC to 28 V DC; emergency DC provided by 25 Ah and 42 Ah low-maintenance Ni/Cd batteries. Provision for external AC and DC power connection. Triple logic-controlled AC power centre performs primary AC power distribution and high-power secondary distribution via solid-state switches and 'smart' contactors; low-power AC distributed through thermal circuit breakers in the cockpit. Triple logic-controlled DC power centre provides non-interruptible primary DC power distribution, emergency bus supplies and normal DC supplies to four secondary power distribution assemblies (SPDAs) throughout the aircraft to provide remote logic-controlled power to all DC loads. Two CDUs in the cockpit allow for remote sensing/setting and resetting of circuit breakers.

Tailcone-mounted Honeywell RE220(GX) APU provides electrical power (45 kVA ground; 40 kVA flight), as well as bleed air and main engine starting; APU is certified for operation up to 13,715 m (45,000 ft), in-flight starting up to 11,280 m (37,000 ft) and engine starting up to 9,145 m (30,000 ft).

Triple-redundant hydraulic systems at pressure of 207 bar (3,000 lb/sq in), with bootstrap reservoirs.

Walter Kidde Aerospace integrated aircraft fire detection and extinguishing system provides continuous fire detection monitoring in engine nacelles, APU compartment, main landing gear bays and cabin; dual extinguishers provide two-shot fire suppression in main engine and APU bays. Aircraft serviceability monitored by CAIMS (central aircraft information and maintenance system) with facilities including in-flight display.

AVIONICS: Honeywell Primus 2000XP as core system.

Comms: Dual VHF (third optional); dual Rockwell Collins HF; dual transponders; dual radio management systems; Coltech five-channel Selcal; Honeywell digital FDR and CVR; ELT; satcom optional, with antenna mounted in fin cap; Teledyne Magnastar Office in the Sky datalink optional.

Radar: Colour weather radar with dual controllers.

Flight: Dual flight management systems (third optional) with dual Cat. II autopilots and triple digital air data computers providing fail-safe AFCS; triple laser gyro inertial reference systems; GPS with option for second sensor; ADF; VOR/ILS; DME; TCAS II; Honeywell EGPWS with terrain database integrated into Primus 2000XP system for EFIS display.

Instrumentation: Dual EFIS comprising six 203 x 178 mm (8 x 7 in) CRT multifunction displays, for PFD and EICAS functions; dual Rockwell Collins digital radio altimeter; combined standby airspeed/altimeter, standby artificial horizon and stowable standby heading indicator. Thales HFDS with Cat. II landing capability and lightning sensor system optional. Bombardier Enhanced Vision System (BEVS) standard from first quarter 2005.

Data below apply to Global Express and Global Express XRS, except where noted.

DIMENSIONS, EXTERNAL:

Wing span over winglets	28.65 m (94 ft 0 in)
Wing chord: at root	6.43 m (21 ft 1 in)
at tip	1.24 m (4 ft 1 in)
Wing aspect ratio	8.6
Length: overall	30.30 m (99 ft 5 in)
fuselage	26.31 m (86 ft 4 in)
Diameter of fuselage, constant portion	2.69 m (8 ft 10 in)
Height overall	7.57 m (24 ft 10 in)
Tailplane span	9.68 m (31 ft 9 in)
Wheel track (c/l of shock-absorbers)	4.06 m (13 ft 4 in)
Wheelbase	12.78 m (41 ft 11 in)
Passenger door: Height	1.83 m (6 ft 0 in)
Width:	0.91 m (3 ft 0 in)
Baggage door: Height	0.84 m (2 ft 9 in)
Width	1.09 m (3 ft 7 in)
Emergency exit: Height	0.99 m (3 ft 3 in)
Width	0.51 m (1 ft 8 in)

DIMENSIONS, INTERNAL:

Flight deck volume	3.99 m ³ (141.0 cu ft)
Cabin (excl flight deck): Length	14.73 m (48 ft 4 in)
Width at floor	2.11 m (6 ft 11 in)
Max width	2.49 m (8 ft 2 in)
Max height	1.90 m (6 ft 3 in)
Floor area	31.1 m ² (335 sq ft)
Volume, incl baggage compartment	60.6 m ³ (2,140 cu ft)

AREAS:

Wings, basic	94.95 m ² (1,022.0 sq ft)
Horizontal tail surfaces (total)	22.76 m ² (245.0 sq ft)
Vertical tail surfaces (total)	17.28 m ² (186.0 sq ft)

WEIGHTS AND LOADINGS (A: Global Express; B: Global Express XRS):

Operating weight empty: A	22,816 kg (50,300 lb)
B	23,360 kg (51,500 lb)
Max payload: A	2,585 kg (5,700 lb)
Payload with max fuel: A	725 kg (1,600 lb)
B	805 kg (1,775 lb)
Fuel with max payload	17,804 kg (39,250 lb)
Max fuel weight: A	19,663 kg (43,350 lb)
B	20,400 kg (44,975 lb)
Max ramp weight: A standard	43,205 kg (95,250 lb)
A optional	43,658 kg (96,250 lb)
B	44,565 kg (98,250 lb)
Max T-O weight: A standard	43,091 kg (95,000 lb)
A optional	43,545 kg (96,000 lb)
B	44,452 kg (98,000 lb)
Max landing weight: A, B	35,652 kg (78,600 lb)
Max zero-fuel weight: A, B	25,401 kg (56,000 lb)
Max wing loading:	
A standard	453.8 kg/m ² (92.95 lb/sq ft)
A optional	458.6 kg/m ² (93.93 lb/sq ft)
B	468.2 kg/m ² (95.89 lb/sq ft)
Max power loading:	
A standard	328 kg/kN (3.22 lb/lb st)
A optional	332 kg/kN (3.25 lb/lb st)
B	339 kg/kN (3.32 lb/lb st)

PERFORMANCE:

Max level speed (VMO):	
S/L to FL80	300 kt (555 km/h; 345 mph) CAS
FL80 to FL309	340 kt (629 km/h; 391 mph) CAS
above FL309	M0.89
High cruising speed: A, B	M0.89 (515 kt; 954 km/h; 593 mph)
Normal cruising speed: A, B	M0.85 (488 kt; 904 km/h; 562 mph)
Long-range cruising speed at FL450: A	M0.80 (459 kt; 850 km/h; 528 mph)
Initial cruising altitude: A	13,105 m (43,000 ft)
Time to climb to initial cruising altitude:	
A, B	30 min
Max certified altitude: A, B	15,545 m (51,000 ft)
T-O balanced field length: A	1,774 m (5,820 ft)
B	1,887 m (6,190 ft)
Landing distance, A, B	814 m (2,670 ft)
Runway LCN	55
Range with max fuel and eight passengers, NBAA IFR reserves:	
at M0.85: A	6,010 n miles (11,130 km; 6,916 miles)
B	6,150 n miles (11,390 km; 7,077 miles)
at M0.87: A	5,276 n miles (9,771 km; 6,071 miles)
B	5,450 n miles (10,093 km; 6,272 miles)
Range with max payload:	
A at M0.85	5,187 n miles (9,606 km; 5,969 miles)
A at M0.87	4,596 n miles (8,511 km; 5,289 miles)
Design g limit: A, B	+2.5

OPERATIONAL NOISE LEVELS (all):

T-O	82.4 EPNdB
Approach	89.8 EPNdB
Sideline	88.6 EPNdB

BOMBARDIER GLOBAL 5000

Engineering designation: BD-700-1A11

TYPE: Long-range business jet.

PROGRAMME:

DEVELOPMENT MILESTONES

Design began	99
Announced	25 Oct 01
Marketing began	5 Feb 02
First order (Sino Private Aviation)	28 Feb 02
First flight	7 March 03
Certification	12 Mar 04
First delivery	18 Apr 05

Market and design studies began 1999; announced 25 October 2001; formal launch 5 February 2002; first flight (c/n 9127/C-GERS) 7 March 2003; public debut at Paris Air Show in June 2003; second test aircraft (c/n 9130/C-GLRM) first flew 8 January 2004. Certification by Transport Canada, achieved 12 March 2004 following two aircraft flight test programme; deliveries of 'green' aircraft to completion centres scheduled to begin in second quarter 2004; EASA certification achieved 15 July 2004, followed by JAA Letter of Recommendation on 26 August and FAA certification 20 September 2004; service entry (C-GERS, as demonstrator) fourth quarter 2004; customer service entry 18 April 2005.

On 11 October 2004, second prototype Global Express 5000, carrying three crew and a representative payload equivalent to eight passengers, set a National Aeronautic Association-sanctioned speed record, flying 4,597 n miles (8,514 km; 5,290 miles) from Dublin to Las Vegas to attend the NBAA Convention in 9 hours 55 minutes.

CUSTOMERS: Launch customer TAG Aeronautics ordered five on 5 November 2001; letters of intent for 15 aircraft at time of launch (these delivery positions all assigned by late 2004, 15th being 173rd of Global Express family). Sino Private Aviation of Hong Kong ordered one aircraft during Asian Aerospace 2002 in Singapore on 28 February 2002, and the US Federal Aviation Administration ordered one on 19 October 2004 for delivery by 30 September 2005 after outfitting as an airborne research and development laboratory by Midcoast Aviation of St Louis, prior to service at the FAA William J Hughes Technical Center in Atlantic City, New Jersey. First delivery of completed aircraft 18 April 2005 to a customer in the Middle East; total of 17 delivered in 2005, and 11 in the first nine months of 2006. Potential market for 750 aircraft in class by 2010.

COSTS: USD33 million 'green' (2002).

DESIGN FEATURES: Based on Global Express, with 1.83 m (6 ft 0 in) reduction in fuselage length, and 1,200 n mile (2,222 km; 1,381 mile) reduction in maximum range. Up to 19 passengers.

ACCOMMODATION: Standard interior, developed by Bombardier and C&D Aerospace, features a three-zone cabin with club and conference seating; forward and aft vacuum lavatories; integrated cabin system diagnostic tool to manage environmental system including temperature, lighting, water and waste systems; Goodrich-Hella-designed LED mood lighting; and Rockwell Collins Airshow 21 integrated cabin electronics including DVD/CD/MP3 players, optional satellite TV and standard digital airborne wireless Local Area Network with cabin telephone system and multichannel satcoms with Inmarsat Aero H+, Swift64 and Iridium communication services interfaces.

AVIONICS: Thales Enhanced Flight Vision System (EFVS) granted provisional certification by Transport Canada by June 2005.

Data generally as for Global Express, except the following.

DIMENSIONS, EXTERNAL:

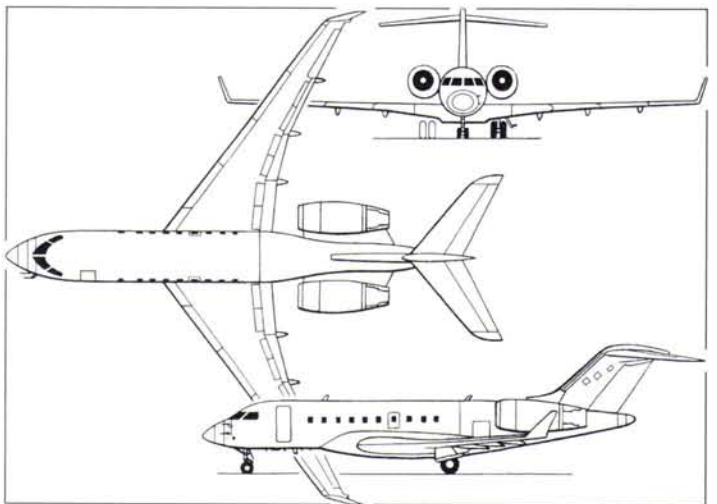
Length overall	29.49 m (96 ft 9 in)
----------------	----------------------

DIMENSIONS, INTERNAL:

Cabin (excl flight deck):	
Length	12.95 m (42 ft 6 in)
Volume	53.29 m ³ (1,882 cu ft)

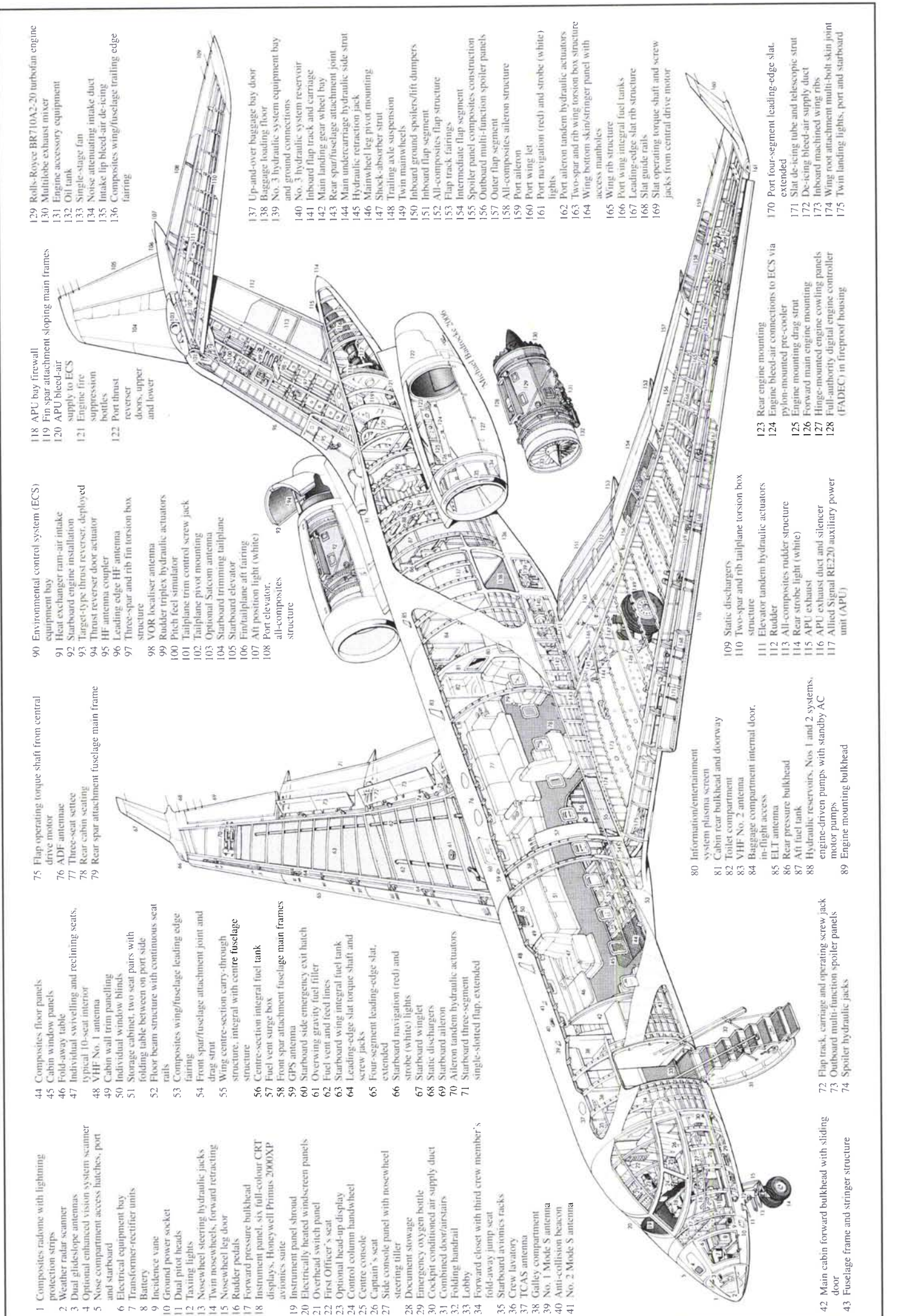
WEIGHTS AND LOADINGS:

Basic operating weight	23,056 kg (50,830 lb)
Payload: max	2,345 kg (5,170 lb)
with max fuel	508 kg (1,120 lb)
Max fuel weight	16,329 kg (36,000 lb)
Fuel with max payload	16,112 kg (35,520 lb)
Max T-O weight: normal	39,780 kg (87,700 lb)
option 1	40,234 kg (88,700 lb)
option 2	40,687 kg (89,700 lb)
Max ramp weight	39,893 kg (87,950 lb)
Max landing weight	35,652 kg (78,600 lb)
Max zero-fuel weight	25,401 kg (56,000 lb)
Max wing loading: normal	419.0 kg/m ² (85.81 lb/sq ft)
option 1	423.7 kg/m ² (86.79 lb/sq ft)
option 2	428.5 kg/m ² (87.77 lb/sq ft)
Max power loading: normal	303 kg/kN (2.97 lb/lb st)
option 1	307 kg/kN (3.01 lb/lb st)
option 2	310 kg/kN (3.04 lb/lb st)



Bombardier Global 5000 general arrangement (James Goulding)

1154679



Bombardier Global 5000, cutaway drawing key (Michael Badrocke)

1151682



Bombardier Global 5000 delivered to US Federal Aviation Administration

1153803

PERFORMANCE:

Cruising speed: max	M0.89 (510 kt; 945 km/h; 587 mph)
normal	M0.85 (488 kt; 904 km/h; 562 mph)
Initial cruising altitude	13,105 m (43,000 ft)
Time to climb to initial cruising altitude	23 min
Max certified altitude	15,545 m (51,000 ft)
T-O balanced field length	1,525 m (5,000 ft)
Landing run	814 m (2,670 ft)
Range, NBAA IFR reserves, three crew, eight passengers:	
at M0.85	4,800 n miles (8,889 km; 5,523 miles)
at M0.88	3,700 n miles (6,852 km; 4,257 miles)

OPERATIONAL NOISE LEVELS:

T-O	79.9 EPNdB
Approach	89.7 EPNdB
Sideline	89.1 EPNdB

BOMBARDIER CSERIES

TYPE: Twin-jet airliner.

PROGRAMME: Bombardier launched new regional jet programme at Farnborough International air show on 8 September 1998 with unveiling of 90 to 110-seat BRJ-X, but this was abandoned in September 2000. Larger CSeries, formerly known as New Commercial Aircraft Program (NCAP), announced at Farnborough on 19 July 2004 with service entry expected in 2010.

However, on 31 January 2006, after investing USD100 million, Bombardier announced that market conditions were then inappropriate for launching the CSeries. Development work was suspended and 300 employees transferred to other activities, but 50 personnel and USD20 million were assigned to a year of further work on the CSeries business plan with emphasis on attracting partners from China, India, Russia and other areas of fast-growing aerospace markets.

Low rate development continued during 2006, with substitution of C130 variant for C135 and shallower winglets, effectively increasing wing span.

CURRENT VERSIONS: **CSeries 110-STD**: Baseline version.

CSeries 110-ER: Long-range version; strengthened fuselage.

CSeries 130-STD: Stretched version; fuselage plugs fore and aft of wing; strengthened structure.

CSeries 130-ER: Long-range version.

CUSTOMERS: Market for aircraft in CSeries class estimated at 5,800, valued at USD250 billion, between 2004 and 2024.

DESIGN FEATURES: Swept low wing, with winglets common to all versions; sweptback tail surfaces; wing-mounted, podded engines. Design goals include operational flexibility on short- and long-haul routes; total life-cycle cost improvement over existing airliners; 15 per cent improvement in direct operating costs, compared with contemporary in-service designs and 20 per cent improvement over out-of-service designs; 99 per cent despatch reliability, and high passenger appeal through comfort, cabin spaciousness and in flight entertainment systems.

FLYING CONTROLS: Fly-by-wire, with sidestick controllers and advanced systems architecture with flight envelope protection. Fowler flaps; three-section leading-edge slats and five-section spoilers on each wing.

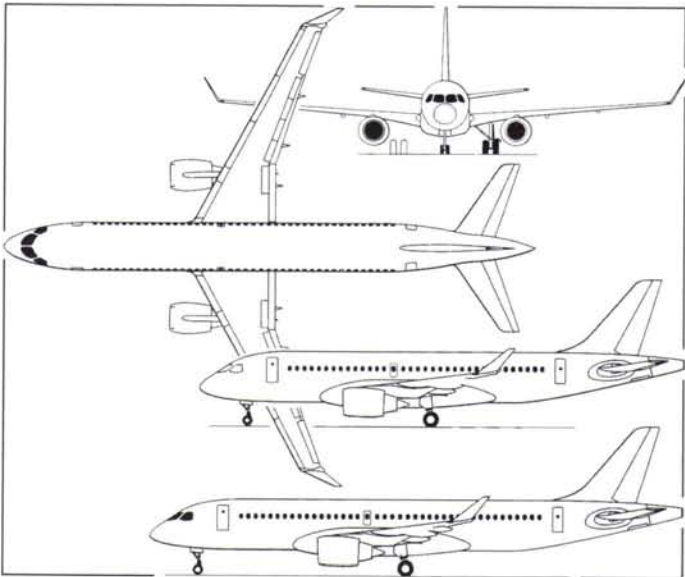
STRUCTURE: Common forgings for all versions; composites control surfaces, leading-edge slats and Fowler flaps, tail surfaces, rear fuselage and tailcone.

LANDING GEAR: Retractable tricycle type. Twin wheels on each unit. Main units retract inwards, nosewheel forward. Carbon brakes.

POWER PLANT: **CSeries 110-STD**: Two 82.3 kN (18,500 lb st) turbofans.

CSeries 110-ER: Two 91.6 kN (20,600 lb st) turbofans.

CSeries 130-STD: Two 91.2 kN (20,500 lb st) turbofans.



Bombardier CSeries C130, with additional side view (upper) of C110 (Paul Jackson)

1158918

CSeries 130-ER: Two 103.6 kN (23,300 lb st) turbofans.

Selected power plant will offer highest bypass ratio for class and targeted at lowest life-cycle costs and Stage 5 noise compliance.

ACCOMMODATION: Two crew on flight deck and three or four cabin attendants. CSeries 110 accommodates 110 passengers at 81 cm (32 in) seat pitch in single class in 3+2 configuration; ATLAS standard galley fore and aft, each with dedicated service door on starboard side; two lavatories, one with access for handicapped passengers, and separate crew and passenger closets all standard. Optional two-class arrangements accommodate 16 in forward business class cabin, and 83 in economy class; or 125 in high-density.

CSeries 1 accommodates 130 passengers at 81 cm (32 in) pitch in single class configuration, or, in two-class arrangement, 14 passengers in forward business class cabin, and 108 in economy class; or 145 in high-density. Passenger doors on port side at front and rear of cabin. Overwing emergency exit on each side. Cabin design aims to provide at least one large window per row of seats on each side to maximise natural lighting and outside view.

SYSTEMS: Emphasis is on integrated aircraft/electrical systems.

DIMENSIONS, EXTERNAL:

Wing span: all	35.35 m (116 ft 0 in)
Length overall: A, B	35.56 m (116 ft 8 in)
C, D	38.76 m (127 ft 2 in)
Height overall: all	10.91 m (35 ft 9 in)
Passenger door (fwd, port):	
Height	1.88 m (6 ft 2 in)
Width	0.86 m (2 ft 10 in)
Passenger door (aft, port):	
Height	1.83 m (6 ft 0 in)
Width	0.76 m (2 ft 6 in)
Service doors (fwd and aft):	
Height	1.52 m (5 ft 0 in)
Width	0.76 m (2 ft 6 in)
Type III overwing exits, port and stbd:	
Height	1.04 m (3 ft 5 in)
Width	0.51 m (1 ft 8 in)

DIMENSIONS, INTERNAL:

Cabin:

Max width, all	3.45 m (11 ft 4 in)
Height: max	2.21 m (7 ft 3 in)
above aisle	2.13 m (7 ft 0 in)
Aisle width: business	0.61 m (2 ft 0 in)
economy	0.58 m (1 ft 11 in)

Underfloor baggage/cargo hold:

Width: at roof	2.21 m (7 ft 3 in)
at floor	1.09 m (3 ft 7 in)
Max height	1.08 m (3 ft 6 1/2 in)



Artist's impression of projected Bombardier CSeries C110

1158919

Volume: CSeries 110-STD/ER	23.5 m ³ (829 cu ft)
CSeries 130-STD/ER	30.5 m ³ (1,076 cu ft)
Overhead storage bins:	
Length	0.61 m (2 ft 0 in)
Height	0.28 m (0 ft 11 in)
Depth	0.36 m (1 ft 2 in)
Volume per passenger	0.07 m ³ (2.60 cu ft)
WEIGHTS AND LOADINGS:	
Max payload: A, B	13,971 kg (30,800 lb)
C, D	16,556 kg (36,500 lb)
Max T-O weight: A	54,705 kg (120,600 lb)
B	60,420 kg (133,200 lb)
C	59,785 kg (131,800 lb)
D	66,225 kg (146,000 lb)
Max landing weight: A	50,350 kg (111,000 lb)
B	52,165 kg (115,000 lb)
C	54,885 kg (121,000 lb)
D	56,925 kg (125,500 lb)
PERFORMANCE (estimated: A, B, C, D, as above):	
Max cruising speed, all	M0.82
Normal cruising speed, all	M0.78
Max operating altitude, all	12,497 m (41,000 ft)
T-O balanced field length: A	1,311 m (4,300 ft)
B	1,615 m (5,300 ft)
C	1,585 m (5,200 ft)
D	2,012 m (6,600 ft)
Max range: A, C	1,800 n miles (3,333 km; 2,071 miles)
B, D	3,000 n miles (5,556 km; 3,452 miles)

BOMBARDIER AEROSPACE TORONTO OPERATIONS

Garratt Boulevard, Downsview, Ontario M3K 1Y5
Tel: (+1 416) 633 73 10
Fax: (+1 416) 375 45 46
VICE PRESIDENT, CANADIAN OPERATIONS: Serge Perron
VICE PRESIDENT AND GENERAL MANAGER, OPERATIONS: Alain Dugas
VICE-PRESIDENT, DASH 8 SERIES 100/200/300 OPERATIONS: Rob Comand
VICE PRESIDENT, DASH 8 SERIES 400 OPERATIONS: Bruce Vannus
VICE-PRESIDENT, GLOBAL EXPRESS OPERATIONS: Trevor Anderson
VICE PRESIDENT, FINANCE: Colin Fernie
VICE PRESIDENT, HUMAN RESOURCES: Bernard Cormier
MANAGER, PUBLIC RELATIONS: Colin Fisher

Established 1928 as The de Havilland Aircraft of Canada Ltd, subsidiary of The de Havilland Aircraft Company Ltd, both absorbed 1961 by Hawker Siddeley Group; ownership transferred to Canadian government 26 June 1974; purchased by Boeing Company 31 January 1986 and made a division of Boeing of Canada Ltd; Boeing's intention to sell announced July 1990.
Sale to Bombardier Inc (51 per cent) and government of Ontario (49 per cent), signed 22 January 1992, supported by help from Ontario and federal governments, with Canadian Export Development Corporation to provide sales financing for Dash 8; all government support conditionally repayable. Bombardier acquired remaining 49 per cent of de Havilland in January 1997.
At its Downsview facility, Bombardier Aerospace Toronto manufactures Dash 8Q series, including spare parts and components, and also some components of the Bombardier Global Express; performs final assembly of Dash 8Q, Global Express and Global 5000; designed and builds wings for Learjet 45. Bombardier 415 assembly is in a 4,750 m² (51,000 sq ft) plant at North Bay, Ontario.

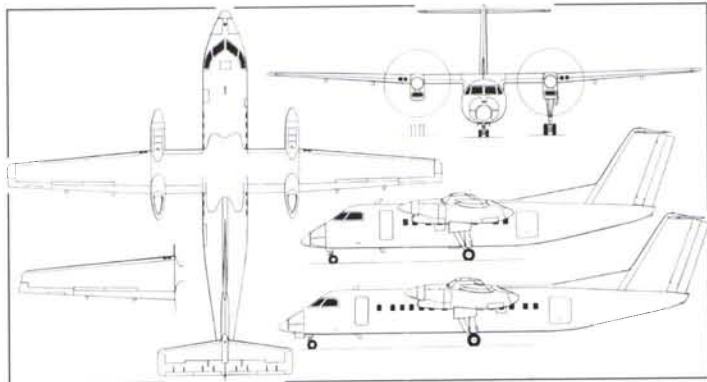
BOMBARDIER DASH 8 Q100 and Q200

TYPE: Twin-turboprop airliner.
PROGRAMME:

DEVELOPMENT MILESTONES

Announced	1980
First flight	20 Jun 83
Certification	28 Sep 84
First flight, production	3 Apr 84
First delivery (norOntair)	23 Oct 84
Entered service (norOntair)	Dec 84

Launched 1980; initially known as DHIC-8; then Dash 8; then Dash 8Q. First flight of prototype (C-GDNK) 20 June 1983, second prototype (C-GGMP) 26 October 1983, third 22 December 1983, fourth aircraft, first with production P&WC PW120 engines, 3 April



Bombardier Dash 8 Q100, with additional side view (bottom) and wingtip of Q300 (Dennis Punnett) 0507404

1984. Certified to Canadian DoT, FAR Pts 25 and 36 and SFAR No. 27 on 28 September 1984, followed by FAA on 11 December 1984; also certified in Australia, Austria, Brazil, Cameroon, China, Colombia, Germany, Ireland, Italy, Maldives, Netherlands, New Zealand, Norway, Papua New Guinea, South Africa, Taiwan, UK and United Arab Emirates. First delivery (norOntair) 23 October 1984 followed by service entry in December: 500th Dash 8 (a Series 200, N355PH) delivered 21 November 1997 to Horizon Air, 600th of type delivered 6 March 2001 (see Q300). Total Dash 8 fleet time at June 2004 (not including Q400) was 13,796,700 hours and 16,713,423 cycles, with 99.4 per cent despatch reliability rate.

CURRENT VERSIONS: **Dash 8 Q:** Redesigned interior and noise and vibration suppression system (NVS) standard from second quarter of 1996, reducing cabin noise levels by 12 dB; all current production aircraft are equipped with NVS and known as Dash 8 Qs.

Dash 8 Series 100: Initial version, with choice of PW120A or PW121 engines; discontinued. Model 101 (PW120 or 120A engines; MTOW 14,968 kg; 33,000 lb) certified in 1984; Model 102 (PW120A or 121; MTOW 15,649 kg; 34,500 lb) certified by DoT 12 June 1986 and FAA 7 August 1986; Model 103 (PW121; MTOW as 102) 20 July 1987 and 30 November 1988, respectively; Model 106 (PW121; MTOW 16,465 kg; 36,300 lb) 20 November 1992 and 10 December 1993, respectively.

Dash 8 Series 100A: Introduced 1990; PW120A (or optional PW121) engines and restyled interior with 6.35 cm (2.5 in) more headroom in aisle; first delivery to Pennsylvania Airlines July 1990; discontinued.

Dash 8 Series 100B: Improved version from 1992; PW121 engines enhance airfield and climb performance; discontinued.

Dash 8 Q100: Introduced 1998; PW 120A or optional PW 121 in basic weight version. PW 121 standard in high gross weight (HGW) version.

Dash 8 Series 200A: Increased speed/payload version of Series 100A with PW 123C engines. Transport Canada certification March 1995; first delivery 19 April 1995; discontinued.

Dash 8 Series 200B: As 200A, but with PW123D engines for full power at higher ambient temperatures; discontinued.

Dash 8 Q200: Increased speed/payload version of Q100; increased OEI capability and greater commonality with Series 300. Same airframe as Q100, but PW 123C/D engines give 30 kt (56 km/h; 35 mph) increase in cruising speed, allowing airlines to increase frequencies or operational radius. PW 123D engine offers full power at higher ambient temperatures for improved hot-and-high airfield performance. Initial Model 201 (PW123C engines) certified by Canadian DoT 24 August 1995 and by FAA 4 January 1996; Model 202 (PW123D) 9 March and 19 April 1995, respectively.

Detailed description applies to Q200 except where indicated.

Dash 8 Q300 and Q400: described separately.

Dash 8M and Triton: Special missions versions, previously promoted, including Canadian CC-142 and US Air Force E-9A.

CUSTOMERS: By 31 January 2006, orders received for 299 Srs 100 subvariants and 98 Srs 200s, of which 299 and 96 respectively had then been delivered (including military Dash 8Ms). Refer to table in Dash 8 Q400 entry.

The US Department of Homeland Security's Bureau of Immigration and Customs Enforcement has ordered two Q200s in Maritime Patrol Aircraft (MPA) configuration. Prime contractor is ATK Mission Research of Fort Worth, Texas, whose Aircraft Systems Division will install mission equipment including Raytheon Sea Vue surveillance radar, L-3 Wescam MX-15 electro-optical/infrared sensor and an integrated sensors and display system (ISADS) following airframe modification from airliner configuration by Field Aviation Company, Inc of Toronto that will include upgraded navigation and communications suites, mission workstations and observation windows.



Bombardier Dash 8 Q100 of Ryukyu Air Commuter

1153778

COSTS: Unit cost approximately USD12 million (2000).

DESIGN FEATURES: T tail, swept fin with large dorsal fin. Wing has constant chord inboard section and tapered outer panels; thickness/chord ratio 18 per cent at root, 13 per cent at tip; dihedral 2° 30' on outer panels; inboard leading-edges drooped; 3° washout at wingtips.

FLYING CONTROLS: Conventional and power-assisted. Fixed tailplane; horn-balanced elevator with four tabs; mechanically actuated horn-balanced ailerons with inset tabs; hydraulically actuated roll spoilers/lift dumpers forward of each outer flap; two-segment serially hinged rudder, hydraulically actuated; yaw damper; stall strips on leading-edges outboard of engines; two-section slotted Fowler flaps. Digital AFCS.

STRUCTURE: Fuselage near-circular section, flush riveted and pressurised; adhesive bonded stringers and cutout reinforcements; wing leading-edge, radome, nose bay, wing/fuselage and wingtip fairings, dorsal fin, fin leading-edge, fin/tailplane fairings, tailplane leading-edges, elevator tips, flap shrouds, flap trailing-edges and other components of Kevlar and Nomex; wing has tip-to-tip torsion box. Wheel doors of Kevlar and other composites.

LANDING GEAR: Retractable tricycle type, by Dowty Aerospace, with twin wheels on each unit. Steer-by-wire nose unit retracts forward, main units rearward into engine nacelles. Goodrich mainwheels and brakes; Hydro-Aire Mk 3 anti-skid system. Tyres 26.5x8.0-13 (12 ply) or high flotation H31x9.75-13 (10 ply) on main units; 18x5.5 (10 ply) or 22x6.50-10 (12 ply) on nose unit. Standard tyre pressures: main 9.03 bar (131 lb/sq in), nose 5.52 bar (80 lb/sq in). Low-pressure tyres optional, pressure 5.31 bar (77 lb/sq in) on main units, 3.31 bar (48 lb/sq in) on nose unit.

POWER PLANT: *Q100:* Two 1,491 kW (2,000 shp) Pratt & Whitney Canada PW 120A turboprops, driving Hamilton Sundstrand 14SF-7 four-blade constant-speed fully feathering aluminium/glass fibre propellers with reverse pitch, standard on basic weight version. Two 1,603 kW (2,150 shp) PW 121s optional on this version and standard on High Gross Weight version.

Q200: Two 1,603 kW (2,150 shp) PW 123C/D turboprops, driving Hamilton Sundstrand 14SF-23 propellers; PW 123C is flat-rated for full power at up to 26°C; PW 123D maintains same power at up to 45°C.

Standard usable fuel capacity (in-wing tanks) 3,160 litres (835 US gallons; 695 Imp gallons); optional auxiliary tank system increases this to 5,700 litres (1,506 US gallons; 1,254 Imp gallons). Pressure refuelling point in rear of starboard engine nacelle; overwing gravity point in each outer wing panel. Oil capacity 21 litres (5.5 US gallons; 4.6 Imp gallons) per engine.

ACCOMMODATION: Crew of two on flight deck, plus cabin attendant. Dual controls standard. Standard commuter layout provides four-abreast seating, with central aisle, for 37 passengers at 79 cm (31 in) pitch, plus buffet, lavatory and large rear baggage compartment. Wardrobe at front of passenger cabin, in addition to overhead lockers and underseat stowage, provides additional carry-on baggage capacity. Alternative 39-passenger, passenger/cargo or corporate layouts available at customer's option. Movable bulkhead to facilitate conversion to mixed traffic. Port side airstair door at front for crew and passengers; large inward-opening port side door aft of wing for cargo loading. Emergency exit each side, in line with wing leading-edge, and opposite passenger door on starboard side. Entire accommodation pressurised and air conditioned.

SYSTEMS: Pressurisation system with maximum differential 0.38 bar (5.5 lb/sq in). Normal hydraulic installation comprises two independent systems, each having an engine-driven variable displacement pump and an electrically driven standby pump; accumulator and hand pump for emergency use. Electrical system DC power provided by two starter/generators, two transformer-rectifier units, and two Ni/Cd batteries. Variable frequency AC power provided by two engine-driven AC generators and three static inverters. Ground power receptacles in port side of nose (DC) and rear of starboard nacelle (AC). Rubber-boot de-icing of wing, tailplane and fin leading-edges and nacelle intakes by pneumatic system; electric de-icing of propeller blades, pitot static ports, stall warning transducer, engine intake adaptor and elevator horn leading-edge. APU optional. Simmonds fuel monitoring system.

AVIONICS: Rockwell Collins and Honeywell com/nav.

Comms: Dual Rockwell Collins VHF-22; single Mode C transponder. Avtech audio integrating system. Telephonics PA system.

Radar: Primus P660 colour weather radar.

Flight: Rockwell Collins DME-42, ADF-60A, Honeywell Mk VIII EAPNS, Honeywell SPZ-8000 dual-channel digital AFCS with integrated fail-operational flight director/autopilot system, dual digital air data system. Optional FMS and GPS.

Instrumentation: Honeywell EFIS. Rockwell Collins/Flight Dynamics HGS 2000 head-up guidance system for Cat. IIIa operation optional.

DIMENSIONS, EXTERNAL:

Wing span	25.91 m (85 ft 0 in)
Wing aspect ratio	12.4
Length overall	22.25 m (73 ft 0 in)
Fuselage max diameter	2.69 m (8 ft 10 in)
Height overall	7.49 m (24 ft 7 in)
Elevator span	7.92 m (26 ft 0 in)
Wheel track (c/l of shock-struts)	7.87 m (25 ft 10 in)
Wheelbase	7.95 m (26 ft 1 in)
Propeller diameter	3.96 m (13 ft 0 in)
Propeller ground clearance	0.94 m (3 ft 1 in)
Propeller fuselage clearance	0.76 m (2 ft 6 in)
Passenger/crew door (fwd, port):	
Height	1.66 m (5 ft 5½ in)
Width	0.76 m (2 ft 6 in)
Height to sill	1.09 m (3 ft 7 in)
Baggage door (rear, port): Height	1.52 m (5 ft 0 in)
Width	1.27 m (4 ft 2 in)
Height to sill	1.09 m (3 ft 7 in)

DIMENSIONS, INTERNAL:

Cabin (excl flight deck): Length	9.14 m (30 ft 0 in)
Max width	2.49 m (8 ft 2 in)
Width at floor	2.03 m (6 ft 8 in)
Max height	1.96 m (6 ft 5 in)
Floor area	23.60 m² (254.0 sq ft)
Volume	37.6 m³ (1,328 cu ft)
Baggage compartment volume	8.5 m³ (300 cu ft)

AREAS:

Wings, gross	54.35 m² (585.0 sq ft)
Ailerons (total)	1.12 m² (12.1 sq ft)
Fin	9.81 m² (105.6 sq ft)
Rudder	4.31 m² (46.4 sq ft)
Tailplane	8.97 m² (96.5 sq ft)
Elevators (total)	4.97 m² (53.5 sq ft)

WEIGHTS AND LOADINGS:

Operating weight empty: Q100	10,433 kg (23,000 lb)
------------------------------	-----------------------

Q200	10,501 kg (23,151 lb)
Max usable fuel: standard	2,576 kg (5,678 lb)
optional	4,647 kg (10,244 lb)
Max payload: Q100	4,082 kg (9,000 lb)
Q200	4,195 kg (9,249 lb)
Payload with max fuel: Q100	3,475 kg (7,662 lb)
Q200	3,389 kg (7,471 lb)
Max T-O weight: Q100	15,649 kg (34,500 lb)
Q100 HGW, Q200	16,465 kg (36,300 lb)
Max landing weight: Q100	15,377 kg (33,900 lb)
Q200	15,649 kg (34,500 lb)
Max zero-fuel weight:	
Q100, Q200 JAA	14,515 kg (32,000 lb)
Q200	14,696 kg (32,400 lb)
Max wing loading: Q100	287.9 kg/m² (58.97 lb/sq ft)
Q100 HGW, Q200	303.0 kg/m² (62.05 lb/sq ft)
Max power loading: Q100	5.25 kg/kW (8.63 lb/shp)
Q100 HGW, Q200	5.14 kg/kW (8.44 lb/shp)
PERFORMANCE (at 95% standard MTOW, except where indicated):	
Max cruising speed: Q100	265 kt (491 km/h; 305 mph)
Q100 HGW	270 kt (500 km/h; 311 mph)
Q200	290 kt (537 km/h; 334 mph)
Stalling speed, flaps down: all	72 kt (134 km/h; 83 mph)
Max rate of climb at S/L: all	450 m (1,475 ft)/min
Max certified altitude: all	7,620 m (25,000 ft)
Service ceiling: Q100	4,503 m (14,775 ft)
Q100 HGW	5,105 m (16,750 ft)
Q200	4,938 m (16,200 ft)
FAR Pt 25 T-O field length:	
Q100 (PW 121)	991 m (3,250 ft)
Q200	1,000 m (3,280 ft)
FAR Pt 25 landing field length at max landing weight:	
Q100	785 m (2,575 ft)
Q200	780 m (2,560 ft)
Range with 37 passengers:	
Q100	1,020 n miles (1,889 km; 1,173 miles)
Q200	925 n miles (1,713 km; 1,064 miles)
OPERATIONAL NOISE LEVELS (FAR Pt 36 Stage 3 and ICAO Annex 16):	
T-O	80.5 EPNdB
Sideline	85.6 EPNdB
Approach	94.7 EPNdB

BOMBARDIER DASH 8 Q300

TYPE: Twin-turboprop airliner.	
PROGRAMME:	
DEVELOPMENT MILESTONES	
Announced	mid-85
Programme launched	Mar 86
First flight	15 May 87
Certification	14 Feb 89
First delivery (TimeAir)	27 Feb 89

Dash 8 Series 300 announced mid-1985 as stretch of Series 200; launched March 1986; first flight (modified Series 100 prototype C-GDNK) 15 May 1987; Canadian DoT certification 14 February 1989; first delivery (Time Air) 27 February 1989; FAA type approval 8 June 1989; now also certified in Antigua, Argentina, Australia, Austria, Bahamas, Brazil, Chile, China, Colombia, Egypt, Germany, Ireland, India, Indonesia, Italy, Jordan, Malaysia, Maldives, Mexico, Netherlands, New Zealand, Norway, Romania, Senegal, South Africa, Spain, Taiwan, Thailand, United Arab Emirates and Zambia. Low-noise Dash 8 Q (see Series 200 for details) became standard version from 1996. A Q300 delivered to Air Nippon on 6 March 2001 was the 600th Dash 8.

CURRENT VERSIONS: **Series 300, 300A, 300B and 300E:** Initial versions, described in 1998–99 and earlier editions.

Q300: Introduced 1998; differs from Q200 in having extended wingtips; 3.43 m (11 ft 3 in) two-plug fuselage extension giving standard seating for 50 at 81 cm (32 in) pitch or 56 at 74 cm (29 in) pitch, plus second cabin attendant; also larger galley, galley service door, additional wardrobe, larger lavatory, dual air conditioning packs and optional Turbomach T-40 APU; powered by 1,775 kW (2,380 shp) P&WC PW123s driving Hamilton Standard 14SF-23 four-blade propellers standard in basic version; 1,864 kW (2,500 shp) PW 123Bs optional in basic and standard in high gross weight (HGW) versions provide increased mechanical power for improved take-off performance in low and cold conditions; optional 1,775 kW (2,380 shp) PW 123Es provide 5 per cent increase in thermodynamic power up to 40°C (96°F) for improved hot-and-high performance; fuel capacity as Q200; tyre pressures increased (mainwheels 6.69 bar; 97 lb/sq in, nosewheels 4.14 bar; 60 lb/sq in). NVS system standard on all aircraft produced from second quarter 1996.

Available as Model 301, as initially certified, MTOW 18,642 kg (41,100 lb); Model 311 (combi) and Model 315 have same weight, but option of 18,996 kg (41,880 lb) or 19,504 kg (43,000 lb) with emergency exit modifications embodied; certified 31 July 1990/14 September 1990 for Model 311 and 2 June 1995/28 June 1995 for Model 315.

CUSTOMERS: Firm orders for 243 by 31 January 2006, of which 223 then delivered. Refer to table in Dash 8 Q400 entry.

COSTS: USD14.3 million (2000).

DIMENSIONS, EXTERNAL (As for Q200 except):

Wing span	27.43 m (90 ft 0 in)
Wing aspect ratio	13.4
Length overall	25.68 m (84 ft 3 in)
Wheelbase	10.01 m (32 ft 10 in)

DIMENSIONS, INTERNAL (As for Q200 except):

Cabin (excl flight deck): Length	12.65 m (41 ft 6 in)
Floor area	30.57 m² (329.0 sq ft)
Volume	52.0 m³ (1,838 cu ft)
Baggage compartment volume:	
with 50 passengers	9.1 m³ (320 cu ft)
with 56 passengers	7.9 m³ (280 cu ft)

AREAS:

Wings, gross	56.21 m² (605.0 sq ft)
Ailerons (total)	1.87 m² (20.18 sq ft)
Tail surfaces	as for Series 100A/200A



Dash 8 Q300 operated by Royal Wings of Jordan

1153752

WEIGHTS AND LOADINGS:	
Operating weight empty: basic	11,812 kg (26,042 lb)
HGW	11,793 kg (26,000 lb)
Max usable fuel: standard	2,576 kg (5,679 lb)
optional	4,646 kg (10,243 lb)
Max payload: basic	5,061 kg (11,158 lb)
HGW	6,124 kg (13,501 lb)
Payload with max fuel	5,106 kg (11,257 lb)
Max T-O weight: basic	18,642 kg (41,100 lb)
HGW	19,504 kg (43,000 lb)
Max landing weight: basic	18,144 kg (40,000 lb)
HGW	19,050 kg (42,000 lb)
Max zero-fuel weight: basic	16,873 kg (37,200 lb)
HGW	17,917 kg (39,500 lb)
Max wing loading: basic	331.7 kg/m ² (67.93 lb/sq ft)
HGW	347.0 kg/m ² (71.07 lb/sq ft)
Max power loading: basic	5.25 kg/kW (8.63 lb/shp)
HGW	5.49 kg/kW (9.03 lb/shp)
PERFORMANCE (at 95% standard MTOW except where indicated):	
Max cruising speed: basic	287 kt (532 km/h; 330 mph)
HGW	285 kt (528 km/h; 328 mph)
Stalling speed, flaps down	77 kt (141 km/h; 88 mph)
Max rate of climb at S/L	549 m (1,800 ft)/min
Rate of climb at S/L, OEI	137 m (450 ft)/min
Max certified altitude	7,620 m (25,000 ft)
Service ceiling, OEI: basic	4,145 m (13,600 ft)
HGW	3,734 m (12,250 ft)
FAR Pt 25 T-O field length at S/L, ISA, 15° flap:	
basic	1,097 m (3,600 ft)
HGW	1,055 m (3,460 ft)
FAR Pt 25 landing field length at max landing weight:	
basic	1,010 m (3,315 ft)
HGW	1,040 m (3,415 ft)
Range, HGW with 50 passengers:	
standard fuel	924 n miles (1,711 km; 1,063 miles)
auxiliary fuel	1,098 n miles (2,033 km; 1,263 miles)
OPERATIONAL NOISE LEVELS (FAR Pt 36):	
T-O	80 EPNdB
Sideline	86.9 EPNdB
Approach	93.3 EPNdB

BOMBARDIER DASH 8 Q400

TYPE: Twin-turboprop airliner.
PROGRAMME:

DEVELOPMENT MILESTONES

Programme launched	Jun 96
First prototype material cut	Dec 96
Rolled out	21 Nov 97
First flight	31 Jan 98
Certification	14 Jun 99
First delivery (SAS Commuter)	20 Jan 00
Entered service (SAS Commuter)	7 Feb 00

Launched June 1995 as stretch of Series 300; component manufacture began December 1996; engine first test flown in January 1997, mounted on nose of Pratt & Whitney Canada Boeing 720B testbed; roll-out 21 November 1997, first flight (C-FJJA) 31 January 1998; five aircraft participated in the 1,900 hour, 1,400 sortie flight test programme, based at the Bombardier Flight Test Centre in Wichita, Kansas, leading to Transport Canada CAR 525 Amendment 86 certification on 14 June 1999, JAA approval in December 1999 and FAA FAR Pt 25 approval on 8 February 2000. JAA approval for steep approach (5.5° glideslope)



Dash 8 Q400 flight deck

1043855

operations at London City Airport achieved 11 October 2001. First delivery (OY-KCA) to SAS Commuter 20 January 2000, followed by service entry 7 February on Copenhagen, Denmark, to Poznan, Poland route. Q400 fleet flight time totalled 154,800 hours and 177,000 cycles by November 2001. Mitsubishi joined programme as risk-sharing partner in October 1995, with responsibility for design, development and manufacture of fuselage and tail sections.

CURRENT VERSIONS: **Dash 8 Q400:** Standard version as described.

Dash 8 Q402-MR: Multirole air tanker/firebomber version. Two used aircraft (c/n 4040 and 4043), ordered in April 2004 By France's Sécurité Civile to replace a similar number of Fokker F-27s, will be modified by Cascade Aerospace of Abbotsford, British Columbia, to incorporate mission avionics including Thales four-tube EFIS, HUD, VHF/FM/AM radios, GPS, satcom and WEB-Tracking system; and provisions for an external, demountable, 10,000 litre (2,642 US gallon; 2,200 Imp gallon) Aero Union RAF-2 fire retardant tank and delivery system. In transport configuration the aircraft will accommodate up to 64 passengers each with 40 kg (88 lb) of baggage, or in all-cargo arrangement up to 9,000 kg (19,842 lb) of freight on 14 pallets. First delivery (callsign 'Pelican 73') to the Sécurité Civile base at Marseilles-Marganne was scheduled for June 2005, followed by the second aircraft ('Pelican 74') in October 2005.

CUSTOMERS: Total of 151 firm orders by 30 September 2005, at which time 104 had been delivered; refer to table. Launch customer was Great China Airlines (now UNI Airways), which ordered six (since cancelled) in February 1996. US launch customer Horizon Air, which ordered 15 with 15 options, in June 1999, took delivery of its first aircraft on 8 January 2001. First for Changan handed over 27 October 2000. British European (now Flybe) received first on 23 November 2001; Widerøe deliveries began 16 November 2001. Recent customers include FlyBE, which ordered 17, plus 20 options, on 23 April 2003, for

BOMBARDIER Q SERIES ORDERS AND DELIVERIES
(at 31 October 2006)

Customer	Variant	Ordered	Delivered	Backlog
Abu Dhabi Aviation	200	2	2	
AGES/Worldwide	300	6	6	
Air Atlantic	100	15	15	
AirBC	100	12	12	
	300	6	6	
Air Creebec	100	1	1	
Air Dolomiti	300	3	3	
Air Maldives	200	1	1	
Air Manitoba	100	1	1	
Air New Zealand	300	17	11	6
Air Nippon Network/ANK	300	5	5	
Air Niugini	200	2	2	
Air Nostrum	300	19	19	
Air Nova	100	6	6	
Air Ontario	100	30	30	
	300	6	6	
Air Senegal International	300	1	1	
Air Wisconsin	100	5	5	
	300	7	7	
Alberta Government	100	1	1	
All Nippon Airways	400	14	13	1
ALM	300	2	2	
Amakusa	100	1	1	
America West	100	12	12	
Ansett New Zealand	100	2	2	
Augsburg Airways	200	2	2	
	300	7	7	
	400	5	5	
Australian Airlines	100	4	4	
Austrian arrows ¹	100	11	11	
	300	19	19	
	400	10	10	
Aviaco/Furlong	300	4	4	
Avline	300	4	4	
BPX Colombia	200	1	1	
Bahamasair	300	3	3	
British European	200	3	3	
	300	4	4	
	400	4	4	
Brymon Airways	300	10	10	
BWIA	300	4	4	
Canadian DND	100	6	6	
Caribbean Aircraft Leasing	300	4	4	
CCAir	100	2	2	
Changan	400	3	3	
City Express	100	4	4	
Contact Air	100	2	2	
	300	4	4	
DAC Air	300	1	1	
Eastern Australia	200	1	1	
Eastern Metro Express	100	8	8	
Elveden Investments	100	3	3	
	300	1	1	
Fairways Corp	100	1	1	
Field Aviation	300	3	2	1
Flybe ³	400	41	20	21
Frontier	400	10		10
GPA Jetprop	100	16	16	
	300	14	14	
Hamburg Airlines	100	2	2	
	300	2	2	
Horizon Air	100	21	21	
	200	28	28	
	400	31	18	13
Hydro-Quebec	400	2	2	
Interot	100	2	2	
	300	1	1	
JAL/Japan Air Commuter	400	11	9	2
Jeju Air	400	5	3	2
LADS	200	1	1	
LIAT	100	5	5	
	300	3	3	
Luxair	900	3		3
MarkAir	300	2	2	
Mesa Air	200	12	12	
Mexican Navy	200	1	1	
Midroc Aviation	200	2	2	
Mobil Oil	100	1	1	
National Air Support	300	3	-	3
National Jet	200	6	6	
	300	2	2	
Norfolk Airlines	100	1	1	
norOntair	100	2	2	
Northwest Airlines	100	25	25	
Norwegian CAA	100	1	1	
Oriental Air Bridge	200	2	2	
Palestinian	300	2	2	
Petroleum Air Service	300	5	4	1
Porter Airlines	400	10	2	8
Qantas Airways	200	1	1	
	300	16	16	
	400	7	7	
Rheintalflug	100	3	3	
	300	3	3	
Royal Wings	300	1	1	
Ryukyu Air Commuter	100		4	

Customer	Variant	Ordered	Delivered	Backlog
SAS Commuter	300	1		1
	400	28	28	
	200	1	1	
Saeaga Airlines	300	1	1	
	200	3	3	
	100	1	1	
Saudi Aramco	300	2	2	
	300	1	1	
	300	12	12	
Schreiner Airways	400	2	2	
	100	2	2	
	400	4		4
Sojitz/JCAB	200	2	2	
	100	4	4	
	300	10	10	
South African Express	100	2	2	
	400	1	1	
	100	4	4	
Talair	300	14	14	
	100	2	2	
	100	2	2	
Tassili	200	56	56	
	100	19	19	
	200	3	3	
TAVAJ	100	15	15	
	300	4	4	
	400	3	3	
Time Air	300	2	2	
	100	3	3	
	200	7	3	4
Transport Canada	300	6	5	1
	400	2	1	1
	400			
Tyco				
UNI Airways ²				
USAF/Sierra				
USAir Express				
US Immigration and Customs				
Wideroe's				
Zhejiang Airlines				
undisclosed				
Totals		843	761	82

Notes: Operators with leased Dash 8 aircraft include, but are not necessarily restricted to, the following: Air Alliance, ERA, Lloyd Aviation, Lufthansa CityLine, Sabena, TABA. US Airways operators include Piedmont Airlines and Allegheny Commuter.

¹ Formerly Tyrolean.
² UNI Airways received initial aircraft when named Great China Airlines.
³ British European (now Flybe) received initial aircraft when named Jersey European Airways.

SUMMARY			
	Ordered	Delivered	Backlog
Series 100	299	299	
Series 200	101	97	4
Series 300	247	234	13
Series 400	196	131	65
Totals	843	761	82

delivery from second quarter 2003. All Nippon Airways, which ordered two in February 2004 and four in April 2004, bringing its firm order total to 12. Total fleet time at August 2004 stood at 428,520 hours and 476,107 cycles, with 99.4 per cent despatch reliability rate. COSTS: Flybe order for 17 aircraft, valued at USD362 million (2003). Direct operating cost in US currency, based on 70 passengers over 200 n mile (370 km; 230 mile) stage length: in USA 7.40 cents per seat-mile; in Europe 7.50 cents per seat-kilometre (both 2003).

DESIGN FEATURES: Compared with Q300, fuselage stretched 6.83 m (22 ft 5 in) to seat up to 78. Other new features include engines; propeller; tapered inboard wing section increasing propeller/fuselage clearance to 1.09 m (3 ft 7 in); revised wing/fuselage fairings; ailerons, elevators and fin cap fairing; landing gear; baggage/service doors; upgraded avionics. Airframe designed for crack-free life of 40,000 flight hours/80,000 flight cycles and an economic life of 80,000 flight hours/160,000 flight cycles. Common type rating with Q100/200/300. STRUCTURE: Generally as for Q100 and Q200. De Havilland Canada manufactures cockpit section and wing and performs final assembly; other participants in programme include AlliedSignal (electrical power system); Goodrich (brakes); Dowty Aerospace (propellers); Menasco (landing gear); Micro Technica (flap system); Mitsubishi (fuselage and tail sections); Parker Bertea Aerospace (hydraulics and fuel system); Pratt & Whitney Canada (engines); Sextant Avionique (avionics system); and Shorts (engine nacelles). POWER PLANT: Two Pratt & Whitney Canada PW150A turboprops with FADEC, each flat rated to 3,781 kW (5,071 shp) at 37.4°C, driving Dowty R408 six-blade, slow-turning (1,020 rpm for T-O; 850 rpm cruise) composites propellers giving 15 per cent reduction in



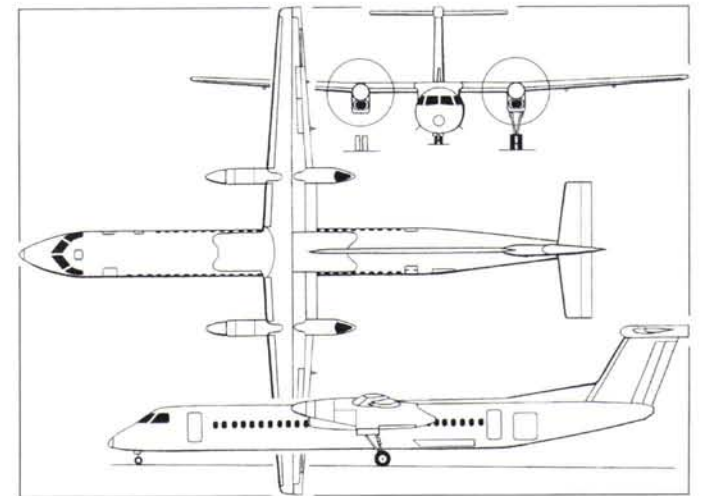
Bombardier Dash 8 Q400 flown by Hydro-Québec

1043857



Dash 8 Q400 cabin interior

1043854



General arrangement of the Dash 8 Q400 (Paul Jackson)

1159828

T-O rpm and 6 to 19 per cent reduction in cruise rpm over Q100/300. Fuel capacity 6,526 litres (1,724 US gallons; 1,436 Imp gallons).

ACCOMMODATION: Variety of cabin configurations providing four-abreast seating, with central aisle, for 70 passengers at 84 cm (33 in) pitch, 74 passengers at 79 cm (31 in) pitch, 78 passengers at 76 cm (30 in), or two-class layout for 10 business class passengers at 86 cm (34 in) pitch and 62 economy class passengers at 79 cm (31 in); NVS system standard.

AVIONICS: Prime contractor, Thales.

Comms: Dual VHF nav/com and mode S transponder; solid-state FDR and cockpit voice recorder; ELT antenna. HF optional

Radar: Weather radar.

Flight: ADF and DME standard. Single or dual UNS-1E FMS, and dual radar altimeters. EGPWS, ACARS, QAR and vertical scale symbology, all optional.

Instrumentation: EFIS employs five 152 x 203 mm (6 x 8 in) LCDs. Optional Flight Dynamics HGS4100 (later HGS4200) head-up guidance system.

DIMENSIONS, EXTERNAL:

Wing span	28.42 m (93 ft 3 in)
Wing aspect ratio	12.8
Length overall	32.84 m (107 ft 9 in)
Fuselage max diameter	2.69 m (8 ft 10 in)
Height overall	8.36 m (27 ft 5 in)
Tailplane span	9.27 m (30 ft 5 in)
Wheel track	8.79 m (28 ft 10 in)
Wheelbase	13.94 m (45 ft 9 in)
Propeller diameter	4.11 m (13 ft 6 in)
Propeller ground clearance	0.97 m (3 ft 2 in)
Propeller fuselage clearance	1.10 m (3 ft 7¼ in)
Passenger/crew door (port, fwd):	
Height	1.66 m (5 ft 5½ in)
Width	0.76 m (2 ft 6 in)
Height to sill	1.22 m (4 ft 0 in)
Passenger/crew door (port, rear):	
Height	1.73 m (5 ft 8 in)
Width	0.71 m (2 ft 4 in)
Height to sill	1.52 m (5 ft 0 in)
Baggage door (port, rear): Height	1.55 m (5 ft 1 in)
Width	1.27 m (4 ft 2 in)
Height to sill	1.55 m (5 ft 1 in)
Baggage door (stbd, fwd): Height	1.45 m (4 ft 9 in)
Width	0.71 m (2 ft 4 in)
Height to sill	1.17 m (3 ft 10 in)
Service door (stbd, aft): Height	1.45 m (4 ft 9 in)
Width	0.71 m (2 ft 4 in)
Height to sill	1.52 m (5 ft 0 in)
DIMENSIONS, INTERNAL:	
Cabin (excl flight deck): Length	18.80 m (61 ft 8 in)
Max width	2.51 m (8 ft 3 in)
Max height	1.95 m (6 ft 5 in)

Floor area	38.2 m ² (411 sq ft)
Volume	77.6 m ³ (2,740 cu ft)
Baggage volume: fwd	2.58 m ³ (91.0 cu ft)
aft	11.6 m ³ (411 cu ft)
total	14.2 m ³ (502 cu ft)
AREAS:	
Wings, gross	63.08 m ² (679.0 sq ft)
Ailerons (total)	1.87 m ² (20.18 sq ft)
Vertical tail surfaces (total)	14.12 m ² (152.0 sq ft)
Horizontal tail surfaces (total)	16.72 m ² (180.0 sq ft)
WEIGHTS AND LOADINGS:	
Operating weight empty	17,186 kg (37,888 lb)
Max payload	8,670 kg (19,113 lb)
Payload with max fuel	6,831 kg (15,059 lb)
Max T-O weight: basic	27,986 kg (61,700 lb)
intermediate	28,998 kg (63,930 lb)
HGW	29,256 kg (64,500 lb)
Max landing weight	28,009 kg (61,750 lb)
Max zero-fuel weight	25,855 kg (57,000 lb)
Max wing loading: basic	443.7 kg/m ² (90.87 lb/sq ft)
intermediate	459.7 kg/m ² (94.15 lb/sq ft)
HGW	463.8 kg/m ² (94.99 lb/sq ft)
Max power loading: basic	3.70 kg/kW (6.08 lb/shp)
intermediate	3.84 kg/kW (6.30 lb/shp)
HGW	3.87 kg/kW (6.36 lb/shp)
PERFORMANCE (at 95% of standard MTOW, except where indicated):	
Max cruising speed	360 kt (667 km/h; 414 mph)
Max certified altitude	7,620 m (25,000 ft)
Service ceiling, OEI	5,334 m (17,500 ft)
FAR T-O field length at S/L, MTOW	1,300 m (4,265 ft)
FAR landing field length at S/L, MLW	1,287 m (4,221 ft)
Max range, 70 passengers, IFR reserves	1,360 n miles (2,518 km; 1,565 miles)
OPERATIONAL NOISE LEVELS (estimated, FAR Pt 36):	
T-O	78.3 EPNdB
Sideline	84 EPNdB
Approach	94.3 EPNdB

BOMBARDIER 415

US marketing name: SuperScooper
Engineering designation: CL-215-6B11
TYPE: Twin-turboprop amphibian.

PROGRAMME: Introduced as product follow-on to piston-engined Canadair CL-215; given new designation Canadair 415 in 1991 to distinguish new production turboprop model from CL-215T retrofit, but engineering designation retained and new-build turboprop versions are CL-215-6B11. Launched officially 16 October 1991 with firm orders from France and (August 1992) Québec; first flight (C-GSCT) 6 December 1993, although preceded by initial CL-215T conversion (C-FASE), flown on 8 June 1989. Canadian certification 24 June 1994 in Restricted and Utility categories, FAA approval 14 October 1994 in Restricted category. RAI (Italy) approval 27 October 1994 in Restricted category. Fleet had achieved 50,000 flying hours and 190,000 scooping sorties by 31 March 2001. Final assembly relocated to North Bay, Ontario, in November 1998. Production suspended in October 2001 pending new orders (but see 415MP entry below). New designation Bombardier 415 adopted in February 2002.

CURRENT VERSIONS: Standard 415 and first production units are in firefighting configuration.

415MP: Multipurpose version incorporating FLIR, SLAR and nose-mounted search radar for missions such as search and rescue, coastal and border patrol, drug interdiction and environmental monitoring, while retaining firefighting capability. First flight (C-GHVX; 55th aircraft, destined for Greece) 6 March 2002, preceding a 200-hour flight test programme, and was delivered in late March 2004.

415MP can be modified for maritime, SAR, utility transport, drug interdiction and special missions.

415GR: Ordered by Greece, January 1999; based on 415MP; increased weights; boat handling and cargo hoisting provisions. Two (plus an optional third) will be configured for combat search-and-rescue (C-SAR) role, for which, during 2000, SAAB Nyce Aero of Sweden was awarded a three-year contract to install MSS 5000 mission equipment including SLAR (each side), wing-mounted FLIR Systems SeaFLIR, nose-mounted Honeywell Primus WX 660 weather/search radar, digital cameras, autopilot and provision for Have Quick secure radios and rescue beacon receivers. The aircraft will also have an enlarged cargo door to facilitate deployment of an inflatable rescue boat. The Hellenic Air Force C-SAR aircraft will be based at Elefsis AB; delivery was due in May 2003.

CUSTOMERS: See table. First French Canadair 415 delivered to CEV experimental unit 8 February 1995, but trials revealed need for modifications and acceptance delayed until 13 June 1995; deliveries completed June 1997. Ontario provincial government announced order for nine on 2 April 1998. Government of Malaysia expressed interest in acquiring two following demonstration flights in February 2002. Total 59 built by October 2001 production suspension; 60th registered in January 2002, and 62nd registered August 2003 and delivered (I-DPCH to Italy) early 2004. None in 2004. One delivered (to Italy) from stock in 2005; 63rd aircraft registered December 2005.

BOMBARDIER 415 CUSTOMERS
(at June 2004)

Customer	Qty	First aircraft	Delivered
Canada: Ontario province	9	C-GOGD	29 Apr 98
Québec govt	8	C-GQBA	Jul 95
Bombardier (stock)	2	C-GILN	
Croatia ¹	4	9A-CAG	Feb 97
France: Sécurité Civile	12	F-ZBFS	8 Feb 95
Greek govt ²	10	2039	Jan 99
Italy: Protezione Civile ³	18	I-DPCD	27 Jan 95
Total	63		

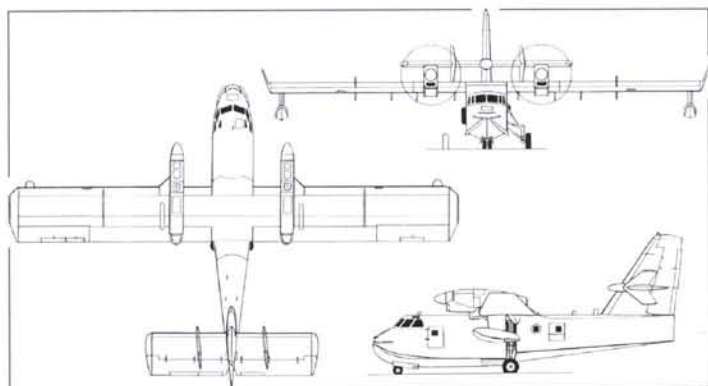
¹ Requirement for six
² Plus five options; order total includes two 415MP
³ Order for two in February 2004 includes option to convert one to 415MP

COSTS: Approximately USD23 million in firefighting configuration (2000).
DESIGN FEATURES: Retains well-proven basic airframe of piston-engined CL-215 (thick wing with zero dihedral and 2° incidence; row of vortex generators on each wing outboard of fence; long stall strip inboard of starboard fence; leading-edge strakes and fences beside



Bombardier 415 twin-turboprop amphibian

1153748

Canadair 415 SuperScooper twin-turboprop general purpose amphibian
(Dennis Punnett)

0507126

engine nacelles; water scoops behind planing step; anti-spray channels in planing bottom chine) but incorporates upgrading modifications and improvements including higher operating weights for increased firefighting productivity; pressure refuelling; wing endplates for lateral stability; finlets and tailplane/fin bullet to recover longitudinal and directional stability affected by relocated thrust line, increased power and new propellers; powered rudder, ailerons and elevators; new electrical system; new 'glass' cockpit with air conditioning; enlarged four-tank firefighting drop system.

FLYING CONTROLS: Conventional and power-assisted. Hydraulically actuated ailerons, elevators and rudder, standard; manual reversion in event of hydraulic failure; geared tab in each aileron, spring tab in rudder and each elevator, plus trim tab in port aileron and port elevator. Hydraulically operated single-slotted flaps, each supported by four external hinges.

STRUCTURE: No-dihedral, no-twist high wing, of constant chord; one-piece structure with two conventional spars, extruded spanwise stringers and interspar ribs and aluminium alloy skins. All-metal, fail-safe, single-step boat-hull fuselage with numerous watertight compartments. Tail surfaces of aluminium alloy sheet and extrusions, with honeycomb panels on control surfaces.

LANDING GEAR: Hydraulically retractable tricycle type. Self-centring twin-wheel nose unit retracts rearward into hull and is fully enclosed by conformal doors. Nosewheel steering standard. Main gear legs retract into wells in sides of hull. Plate mounted on each main gear assembly encloses bottom of wheel well. Mainwheel tyres 15.00-16 (16 ply) tubeless, pressure 5.31 bar (77 lb/sq in); nosewheel tyres 6.50-10 (10 ply) tubed, pressure 6.55 bar (95 lb/sq in). Hydraulic disc brakes. Non-retractable stabilising floats, each carried near wingtip on pylon cantilevered from wing box structure, with breakaway provision.

POWER PLANT: Two 1,775 kW (2,380 shp) Pratt & Whitney Canada PW123AF turboprops, on damage-tolerant mounts capable of withstanding a breach of the compressor/turbine casing, each driving a Hamilton Sundstrand 14SF-19 four-blade constant-speed fully feathering reversible-pitch propeller. Two fuel tanks, each of eight identical flexible cells, in wing spar box, with total usable capacity of 5,796 litres (1,531 US gallons; 1,275 Imp gallons). Single-point pressure refuelling (rear fuselage, starboard side), plus gravity points in wing upper surface.

ACCOMMODATION: Normal crew of two side by side on flight deck, with dual controls. Additional station in maritime patrol/SAR versions for third cockpit member, mission specialist and two observers. For water bomber cabin installation, see Equipment paragraph. Combi layout offers cargo at front, full firefighting capability, plus 11 seats at rear. Other quick-change interiors available for utility/paratroop (up to 14 troop-type folding canvas seats in cabin) or other special missions according to customer's requirements. Flush doors to main cabin on port side of fuselage forward and aft of wings. Optional aft cargo door, height 1.33 m (4 ft 4½ in), width 1.46 m (4 ft 9½ in). Emergency exit on starboard side aft of wing trailing-edge. Crew emergency hatch in flight deck roof on starboard side. Mooring hatch in upper surface of nose. Provision for additional cabin windows.

SYSTEMS: Vapour cycle air conditioning system and combustion heater. Hydraulic system, pressure 207 bar (3,000 lb/sq in), utilises two engine-driven pumps (maximum flow rate 45.5 litres; 12.0 US gallons; 10.0 Imp gallons/min) to actuate nosewheel steering, landing gear, flaps, water drop doors, pickup probes, flight controls, main gear unlocking and wheel brakes. Hydraulic fluid (MIL-H-83282) in air/oil reservoir slightly pressurised by engine

bleed air. Electrically driven third pump provides hydraulic power for emergency actuation of landing gear and brakes and closure of water doors. Electrical system includes two 800 VA 115 V 400 Hz static inverters, two 28 V 400 A DC engine-driven starter/generators and two 40 Ah Ni/Cd batteries. Pneumatic/electric intake de-icing system; airframe ice protection system optional.

AVIONICS: Dual Honeywell Primus 2 digital integrated VHF nav/com.

Comms: Global Wulfsberg VHF/UHF/AM/FM and Rockwell Collins HF radios with central control heads, ELT and dual transponders.

Radar: Search/weather radar optional.

Flight: Dual ADF, VOR/ILS, marker beacon receivers and single DME.

Instrumentation: Honeywell EDZ-605 EFIS with three-tube Integrated Instrument Display System for EADI and EHSI; dual Litel/Honeywell AHRS, dual air data computers, Honeywell radio altimeter.

EQUIPMENT (firefighter): Four integral water tanks in main fuselage compartment, near CG (combined capacity 6,137 litres; 1,621 US gallons; 1,350 Imp gallons), plus eight inward-facing seats in forward cabin. Tanks filled by two hydraulically actuated scoops aft of hull step, fillable also on ground by hose adaptor on each side of fuselage. Four independently openable water doors in hull bottom. Onboard foam concentrate reservoirs (capacity 680 kg; 1,500 lb) and mixing system. Improved drop pattern and drop door sequencing compared with CL-215. Optional spray kit can be coupled with firefighting tanks for large-scale spraying of oil dispersants and insecticides. In a typical firefighting mission, with a water source 6 n miles (11 km; 7 miles) from the fire, aircraft can remain on station for 3 hours, dropping 55,267 litres (14,600 US gallons; 12,157 Imp gallons/h). Water tanks can be scoop-filled completely (ISA at S/L, zero wind) in 12 seconds over a water distance of 1,341 m (4,400 ft); partial water loads can be scooped on smaller bodies of water. Minimum safe water depth for scooping is only 1.40 m (4 ft 7 in).

EQUIPMENT (other versions): Stretcher kits, passenger or troop seats, cargo tiedowns, searchlight and other equipment according to mission and customer requirements. Bombardier 415 can be equipped with maritime surveillance radar and electro-optical sensors, precision navigation and communications equipment and autopilot.

DIMENSIONS, EXTERNAL (A: 415; B: 415MP):

Wing span	28.63 m (93 ft 11 in)
Wing chord, constant	3.54 m (11 ft 7½ in)
Wing aspect ratio	8.2
Length overall: A	19.82 m (65 ft 0½ in)
B	20.29 m (66 ft 7 in)
Beam (max)	2.59 m (8 ft 6 in)
Length/beam ratio	7.5
Height overall: on land	8.98 m (29 ft 5½ in)
on water	6.96 m (22 ft 10 in)
Draught: wheels up	1.12 m (3 ft 8 in)
wheels down	2.03 m (6 ft 8 in)
Tailplane span	10.97 m (36 ft 0 in)
Wheel track	5.25 m (17 ft 2¾ in)
Wheelbase	7.23 m (23 ft 8½ in)
Propeller diameter	3.97 m (13 ft 0¼ in)
Propeller fuselage clearance	0.59 m (1 ft 11¼ in)
Propeller water clearance	1.16 m (3 ft 9¾ in)
Propeller ground clearance	2.77 m (9 ft 1 in)
Forward door: Height	1.37 m (4 ft 6 in) ¹
Width	1.03 m (3 ft 4 in)
Height to sill	1.68 m (5 ft 6 in)
Rear door: Height	1.12 m (3 ft 8 in)
Width	1.02 m (3 ft 4 in)
Height to sill	1.83 m (6 ft 0 in)
Optional large rear cargo door:	
Height	1.12 m (3 ft 8 in)
Width	1.47 m (4 ft 10 in)
Height to sill	1.83 m (6 ft 0 in)
Water drop door: Length	1.60 m (5 ft 3 in)
Width	0.28 m (11 in)
Emergency exit: Height	0.91 m (3 ft 0 in)
Width	0.51 m (1 ft 8 in)

¹ incl 25 cm (10 in) removable sill

DIMENSIONS, INTERNAL:

Cabin, excl flight deck: Length	9.40 m (30 ft 10 in)
Max width	2.39 m (7 ft 10 in)
Max height	1.90 m (6 ft 3 in)
Floor area	19.7 m ² (212 sq ft)
Volume	35.6 m ³ (1,257 cu ft)

AREAS:

Wings, gross	100.33 m ² (1,080.0 sq ft)
Ailerons (total)	8.05 m ² (86.60 sq ft)
Flaps (total)	22.39 m ² (241.00 sq ft)
Fin	11.22 m ² (120.75 sq ft)
Rudder, incl tabs	6.02 m ² (64.75 sq ft)
Tailplane	20.55 m ² (221.20 sq ft)
Elevators (total, incl tabs)	7.88 m ² (84.80 sq ft)

WEIGHTS AND LOADINGS:

Typical operating weight empty: A	13,608 kg (30,000 lb)
B	14,016 kg (30,900 lb)
Max internal fuel weight: A, B	4,649 kg (10,250 lb)
Max payload: A	6,123 kg (13,500 lb)
B	2,495 kg (5,500 lb)
Max ramp weight: A (land)	19,958 kg (44,000 lb)
A (water), B	17,236 kg (38,000 lb)
Max T-O weight: A (land, disposable load)	19,890 kg (43,850 lb)
(non-disposable load)	18,597 kg (41,000 lb)
B (land)	18,597 kg (41,000 lb)
B (water)	17,168 kg (37,850 lb)
Max touchdown weight for water scooping:	
A	16,420 kg (36,200 lb)
Max flying weight after water scooping:	
A	21,319 kg (47,000 lb)
Max landing weight:	
A, B (land and water)	16,783 kg (37,000 lb)
Max zero-fuel weight: A	19,504 kg (43,000 lb)
B	16,511 kg (36,400 lb)

Max wing loading:

A: (land, disposable load)	198.2 kg/m ² (40.60 lb/sq ft)
(non-disposable load)	185.4 kg/m ² (37.96 lb/sq ft)
B (land)	185.4 kg/m ² (37.96 lb/sq ft)
B (water)	171.1 kg/m ² (35.05 lb/sq ft)

Max power loading:

A (land, disposable load)	5.61 kg/kW (9.21 lb/shp)
(non-disposable load)	5.24 kg/kW (8.61 lb/shp)
B (land)	5.24 kg/kW (8.61 lb/shp)
B (water)	4.84 kg/kW (7.95 lb/shp)

PERFORMANCE (at weights shown):

Max cruising speed at FL100	197 kt (365 km/h; 227 mph)
Long-range cruising speed at FL100	150 kt (278 km/h; 173 mph)
Patrol speed at S/L, AUW of 14,741 kg (32,500 lb)	130 kt (241 km/h; 150 mph)
Stalling speed: 15° flap, AUW of 21,319 kg (47,000 lb)	80 kt (149 km/h; 93 mph)
Max rate of climb at S/L: A, at 21,319 kg (47,000 lb)	396 m (1,300 ft)/min
B at 18,597 kg (41,000 lb)	488 m (1,600 ft)/min
T-O distance at S/L, ISA:	
A: (land, disposable load)	844 m (2,770 ft)
(land, non-disposable load)	783 m (2,570 ft)
(water)	808 m (2,650 ft)
B: (land, AUW of 19,890 kg)/(43,850 lb)	823 m (2,700 ft)
(water, AUW of 17,168 kg)/(37,850 lb)	814 m (2,670 ft)
Landing distance at S/L, ISA:	
B: land, AUW of 16,783 kg (37,000 lb)	671 m (2,200 ft)
water, AUW of 16,783 kg (37,000 lb)	665 m (2,180 ft)
Minimum water depth required	1.83 m (6 ft 0 in)
Scooping distance at S/L, ISA (incl safe clearance heights)	1,341 m (4,400 ft)
Scooping time to refill tanks	12 s
Typical time on station	3 h
Ferry range: A	1,310 n miles (2,426 km; 1,507 miles)
Patrol range: B	1,000 n miles (1,852 km; 1,150 miles)
Design g limits (15° flap)	+3.25/-1

CLASS

CANADIAN LIGHT AIRCRAFT SALES AND SERVICES INC

880 Chemin St-Férol, Les Cèdres, Québec J7T 1N3

Tel: (+1 450) 452 47 72 and (+1 888) 977 14 47

Fax: (+1 450) 452 26 94

e-mail: sales@bushcaddy.com

Web: www.bushcaddy.com

PRESIDENT: Sean Gilmore

ADMINISTRATION: Marlene Gill

PRODUCTION MANAGER: Mike Boisvert

EUROPEAN, MIDDLE EAST AND NORTH AFRICAN AGENTS:

AMA Aeromax Affairs

Aérodrome St Laurent, 4 route de Sémignan, F-33112 St Laurent Médoc, France

US AGENTS:

BushCaddy USA, 2307 W Old Highway Road, Morgan, Utah 84050

Tel: (+1 801) 755 97 98

Formed in 1994, CLASS took over production of the previously named Cadi from designer Jean Edoues Potvin and has recently expanded the range to provide six versions of the Bush Caddy as well as introducing the Kestrel in 2003, although this no longer appears to be marketed.

CLASS BUSH CADDY

TYPE: Four-seat kitbuilt.

PROGRAMME: Designed by Jean Edoues Potvin, the original Cadi was first flown in first half of 1993. Kits of the refined Cadi were marketed from 1994. The re-engineered Bush Caddy appeared in 2000. Several new versions have been added to the range since then, using both Rotax and Lycoming power plants. In 2003, the company was developing a 149 kW (200 hp) Jabiru 5100 installation.

CURRENT VERSIONS: **R80**: Smallest aircraft in range and classified as ultralight in USA, Canada and Australia; two seats; designed for engines up to 59.7 kW (80 hp). Voyageur option can be converted from tailwheel to tricycle layout in a few hours, as hardpoints for both variants are provided as standard. 'R' in designation indicates Rotax engine. Sole version available



CLASS Bush Caddy on Full Lotus floats

1037950



Rotax-powered Bush Caddy R120

1037951

also as flyaway, latter being offered as **Bush Caddy Sport** to US LSA rules, including Stratomaster 'glass cockpit' and Rotax 912S or Jabiru 3300 engine, at USD72,500 (2006). Description below refers to R80, unless otherwise stated.

R60: Ultralight version of the above, intended for European market; due for launch during 2003, but no sales known.

R120: Engines in the 48.5 to 89.5 kW (65 to 120 hp) range; two seats. Introduced at AirVenture, Oshkosh, July 2001. Voyageur option available as for R80.

L160: Accepts engines up to 119 kW (160 hp). Seats two-plus-one. 'L' in designation indicates Lycoming engine.

L162: Two-plus-two version of L160. Three, including company prototype (displayed partly complete at AirVenture, July 2005), under construction by mid-2005. First customer's aircraft is non-standard, with 186 kW (250 hp) Subaru engine and 1,134 kg (2,500 lb) MTOW; extension to 1,270 kg (2,800 lb) being planned.

L164: Four-seat version, with 134 kW (180 hp) engine. Displayed statically at AirVenture 2001. Prototype (C-GJDK) first flew 8 September 2001. Two sub-variants: L164B passenger version and L164C 'cargo' version with extra door and removable bench seat rather than fixed seating.

CUSTOMERS: Over 110 of all versions sold by end 2005 of which more than 75 were then flying, including 25 in Canada.

COSTS: Basic kit costs (excluding engine, propeller and internal finishing): R80, USD17,878; R120, USD19,840; L160 USD23,359; L162, USD28,645; L164, USD31,251; quick build kits range from USD35,565 to USD48,618, according to version.

DESIGN FEATURES: Conventional lightplane; high, constant chord wing braced by V struts each side; sweptback cantilever tail surfaces.

Kit includes many preformed and welded parts. Quoted build time 1,000 hours. Fast-build kits are available in which wings and fuselage internal structures are complete and need only covering, which reduces quoted building time to 300 hours.

FLYING CONTROLS: Conventional and manual. No horn balances on control surfaces. Flaps standard on L160 and higher-powered versions and optional for R120.

STRUCTURE: All-metal construction throughout, two-spar wing has a modified Piper Super Cub aerofoil with flat lower surface and has twin 7.6 cm (3 in) extruded aluminium bracing struts and composites wingtips. Monocoque fuselage contains 6061-T6 bulkheads covered with sheet aluminium and has a composites cowl.

LANDING GEAR: Tailwheel type, fixed; R120 has quick-change option from tailwheel to tricycle. Two (optionally faired-in) side Vs hinged to lower longerons, plus half-axes sprung under centreline with bungee cord. Optional floats, amphibious floats and skis can be fitted. Cleveland mainwheels are 7.00-6, with McCreary tyres and Matco hydraulic brakes. Castoring tailwheel, size 2.50-4.

POWER PLANT: **R80**: One 59.6 kW (79.9 hp) Rotax 912 UL driving a two-blade Sensenich metal fixed-pitch propeller; options include 73.5 kW (98.6 hp) Rotax 912 ULS, 74.6 kW (100 hp) Jabiru 3300 and 84.6 kW (113.4 hp) Rotax 914 UL, and two- and three-blade Warp Drive propellers. Fuel capacity 91 litres (24.0 US gallons; 20.0 Imp gallons) in two wingroot tanks of welded metal. Sport version capacity optionally 136 litres (36.0 US gallons; 30.0 Imp gallons).

R120: 73.5 kW (98.6 hp) Rotax 912 ULS standard; engines up to 89.5 kW (120 hp) optional. Standard fuel capacity 100 litres (26.4 US gallons; 22.0 Imp gallons); optional increase to 155 litres (40.8 US gallons; 34.0 Imp gallons).

L160 and L162: One 119 kW (160 hp) Lycoming O-320 standard. Fuel capacity 173 litres (45.6 US gallons; 38.0 Imp gallons) in L160 and 227 litres (60.0 US gallons; 50.0 Imp gallons) in L162.

L164: One 134 kW (180 hp) Lycoming IO-360, driving Sensenich 76EM8 propeller, standard. At least one (C-GFXR) with 185 kW (248 hp) LOM M337C six-cylinder in-line engine. Fuel capacity as L160/L162.

ACCOMMODATION: Pilot and passenger in fully adjustable seats in R80 and R120; bench seat in rear of L160 and L162 for one and two extra passengers, respectively; L164 is full four-seat version and offers optional third door on port side for access to baggage area behind seats. Wraparound Lexan windscreen. Baggage locker behind cabin, with door on port side.

DIMENSIONS, EXTERNAL:

Wing span: R80, R120	9.75 m (32 ft 0 in)
L160, L162, L164	10.97 m (36 ft 0 in)
Wing chord, constant: all	1.60 m (5 ft 3 in)
Wing aspect ratio: R80, R120	6.1
L160, L162, L164	6.9
Length overall: R80, R120	6.73 m (22 ft 1 in)
L160, L162	7.26 m (23 ft 10 in)
L164	7.75 m (25 ft 5 in)
Height: R80, R120	2.01 m (6 ft 7 1/4 in)
L160	2.29 m (7 ft 6 in)
L164	2.32 m (7 ft 7 1/4 in)
Tailplane span	2.62 m (8 ft 7 in)
Wheel track	2.13 m (7 ft 0 in)
Wheelbase	4.44 m (14 ft 7 in)

DIMENSIONS, INTERNAL:

Cabin: Max width: R80, R120, L160	1.12 m (3 ft 8 in)
L164	1.19 m (3 ft 11 in)
Max height: R80, R120	1.12 m (3 ft 8 in)
L160	1.17 m (3 ft 10 in)
L164	1.33 m (4 ft 4 1/2 in)
Baggage hold volume	0.42 m ³ (15.0 cu ft)

AREAS:

Wings, gross: R80, R120	15.61 m ² (168.0 sq ft)
L160, L162, L164	17.56 m ² (189.0 sq ft)

WEIGHTS AND LOADINGS:

Weight empty: R80	294 kg (648 lb)
Sport	308 kg (680 lb)
R120	373 kg (823 lb)
L160	498 kg (1,098 lb)
L164	562 kg (1,239 lb)
Baggage capacity	34 kg (75 lb)
Max T-O weight: R80, Sport	559 kg (1,232 lb)
R120	771 kg (1,700 lb)
L160, L162	998 kg (2,200 lb)
L164	1,134 kg (2,500 lb)
Max wing loading: R80	35.8 kg/m ² (7.33 lb/sq ft)
R120	49.4 kg/m ² (10.11 lb/sq ft)
L160, L162	56.8 kg/m ² (11.64 lb/sq ft)
L164	64.6 kg/m ² (13.23 lb/sq ft)
Max power loading: R80	9.38 kg/kW (15.42 lb/hp)
Sport	7.50 kg/kW (12.32 lb/hp)
R120	10.49 kg/kW (17.23 lb/hp)
L160, L162	8.37 kg/kW (13.75 lb/hp)
L164	8.45 kg/kW (13.89 lb/hp)

PERFORMANCE:

Never-exceed speed (VNE):	113 kt (209 km/h; 130 mph)
L160	130 kt (241 km/h; 150 mph)
L164	139 kt (257 km/h; 160 mph)

Cruising speed at 75% power: R80	83 kt (153 km/h; 95 mph)
Sport	91 kt (169 km/h; 105 mph)
R120	87 kt (161 km/h; 100 mph)
L160	100 kt (185 km/h; 115 mph)
L164	117 kt (217 km/h; 135 mph)
Econ cruising speed at 60% power: R80, R120	78 kt (145 km/h; 90 mph)
L160	91 kt (169 km/h; 105 mph)
L164	104 kt (193 km/h; 120 mph)
Stalling speed, power off: R80	30 kt (55 km/h; 34 mph)
no flaps:	
R120, L160, L162, L164	37 kt (68 km/h; 42 mph)
flaps down: R120	28 kt (52 km/h; 32 mph)
L160, L162, L164	33 kt (62 km/h; 38 mph)
Max rate of climb at S/L: R80, L160	259 m (850 ft)/min
R120	274 m (900 ft)/min
L164	366 m (1,200 ft)/min
Service ceiling: all	3,960 m (13,000 ft)
T-O run: R80, Sport	61 m (200 ft)
R120	107 m (350 ft)
L160	110 m (360 ft)
L164	76 m (250 ft)
Landing run: R80	107 m (350 ft)
R120, L160	153 m (500 ft)
L164	183 m (600 ft)
Range: R80	450 n miles (833 km; 517 miles)
R120	500 n miles (926 km; 575 miles)
L160	625 n miles (1,157 km; 719 miles)
L164	800 n miles (1,481 km; 921 miles)
Endurance	more than 4 h
g limits: R80, R120	+6.2/-4.2
L160, L162, L164	+5.4/-3.2

CLASS KESTREL

TYPE: Side-by-side ultralight/kitbuilt: two-seat lightplane.

PROGRAMME: Epervier Aviation SA of Gosselies, Belgium, flew prototype Epervier (Sparrowhawk) in September 1990, initially as ultralight (ULM), registered OO-964; then as lightplane (ATL) OO-EPV with 11.15 m (36 ft 7 in) wingspan. One production Epervier ULM (OO-EPB) built before project terminated.

Rights acquired by CLASS in April 2003, together with OO-EPB and five incomplete airframes; renamed Kestrel and marketing began immediately to ensure early 2004 launch, but with changes dictated by feedback from potential customers; Rotax 912S or Jabiru 3300 engine; composites wing covering replacing fabric; was due to offer kit version in early 2005. Neither target was achieved; programme in suspension by mid-2005, pending selection of offshore production centre. No evidence of promotion in early 2006. Aircraft to have all-metal wing.



CLASS Kestrel static demonstrator, the former Epervier ULM (Paul Jackson)
1042718

CREATIVE FLIGHT

CREATIVE FLIGHT INC

Elico House, 140 Industrial Park Road, PO Box 596, Haliburton, Ontario K0M 1S0

Tel: (+1 705) 457 38 44

Fax: (+1 705) 457 96 51

e-mail: info@creativeflight.com

Web: www.creativeflight.com

CHIEF DESIGNER: Kirk Creelman

INFORMATION: Terrance Gavan

NEW ZEALAND OFFICE:

PO Box 13697, Johnsonville, Wellington

Fax: (+64 4) 233 98 44

Factory floor area 929 m² (10,000 sq ft). Workforce in early 2006 stood at between five and eight.

CREATIVE FLIGHT AEROCAT

TYPE: Side-by-side kitbuilt; four-seat kitbuilt twin.

PROGRAMME: Project began 1997. Launched at AirVenture, Oshkosh, July 2000. Development prototype (C-GYCC) first flown in single-engine form 15 July 2001; exhibited at Oshkosh 24 to 30 July 2001. Reconfigured in twin-engine form and flown on 5 September 2002; first flight with floats attached (from land) 15 October 2002; water taxiing trials begun 17 October 2002; total flight time stood at 40 hours in August 2003. First kit deliveries scheduled for late 2006.

CURRENT VERSIONS: **Aerocat-SR:** Single-engine version.

Aerocat-SRX: Floatplane/amphibian version of SR.

Aerocat-TR: Twin-engined version.

Aerocat-TRX: Floatplane/amphibian version of TR.

CUSTOMERS: Deposits paid for eight kits up to end of 2005.

COSTS: Basic kit, less engine, propeller, avionics, upholstery and finishing materials "in USD100,000 range" (2006).

DESIGN FEATURES: Designation indicates "multi platform aircraft". Kitplane meeting '51 per cent' rule for amateur construction; easily completed in single- or twin-engine configuration and with amphibian and seaplane landing gear.

Cabin pod, with broad outward visibility, mounted on cranked wings of two-stage taper and with sweepback tips. Engine(s) on arched cabane with central, vertical reinforcement strut. Twin tailbooms and high tailplane; forward boom sections contain main landing gear and attachment points for floats with cutouts for mainwheels when in amphibian mode. Production version has improved cabin aerodynamics including blunter nose reducing length by 15 cm (6 in) from prototype's 8.23 m (27 ft 0 in).

Wing section NLF-0215 (mod); dihedral 3°; twist -4°.

FLYING CONTROLS: Conventional and manual. Horn balances on elevator and rudders; flight-adjustable tab on starboard rudder and port aileron. Fowler flaps, max deflection 40°. Third flap, between booms, is independently actuated; potential advantages during take-off and landing are being assessed during trials. Flaps actuated by wires, with electric control; rudders wire-actuated, with manual control.

STRUCTURE: All structures manufactured by 'open layup, vacuum-formed' process. Fuselage, tailbooms, rudders, ailerons, flaps and floats of glass fibre/foam core construction. Wing spars and cabane of carbon fibre/foam core; nosewheel assembly of carbon fibre.

LANDING GEAR: Retractable tricycle type, hydraulically actuated. Mainwheels 6.00-6; castoring, forward retracting nosewheel, size 5.00-5; differential hydraulic mainwheel brakes. Adjustable air bag suspension. Optional Series 2500 composites floats, with or without wheeled gear. Float installation takes 45 minutes.

POWER PLANT: Prototype flown with single and twin 89 kW (120 hp) Jabiru 3300 flat-six(es) and ground-adjustable pitch propeller(s).

SR and SRX: One 157 kW (210 hp) Textron Lycoming IO-360 flat-four driving a three-blade, reversible MT propeller.

TR and TRX: Two 89 kW (120 hp) Jabiru 3300 flat-sixes, each driving a three-blade, constant-speed Airmaster propeller.

Fuel capacity (usable) 258 litres (68.0 US gallons; 56.7 Imp gallons), contained in tanks in wing struts and tailbooms.



Creative Flight Aerocat during flight trials in 2005

1153749

ACCOMMODATION: Two or four persons, according to version. Rear seats may be replaced by freight. Combined windscreen/gullwing door opening upwards and outwards each side of cabin. Dual controls.

SYSTEMS: Electrical power 12 V; electro-pneumatic pump 6.9 bar (100 lb/sq in) for landing gear actuation.

AVIONICS: To customer's requirements. Prototype has GPS, ELT and VHF radio.

DIMENSIONS, EXTERNAL:

Wing span	10.36 m (34 ft 0 in)
Wing aspect ratio	7.0
Length: fuselage	8.05 m (26 ft 4 3/4 in)
overall	8.23 m (27 ft 0 in)
Height overall	2.72 m (8 ft 11 in)
Propeller diameter: SR, SRX	1.83 m (6 ft 0 in)

DIMENSIONS, INTERNAL:

Cabin: Length	2.74 m (9 ft 0 in)
Max width	1.48 m (4 ft 9 in)
Max height	1.17 m (3 ft 10 in)
Float baggage compartment: (each)	0.28 m ³ (10.0 cu ft)

AREAS:

Wings, gross	15.33 m ² (165.0 sq ft)
--------------	------------------------------------

WEIGHTS AND LOADINGS:

Weight empty: SR, TR	726 kg (1,600 lb)
SRX, TRX	816 kg (1,800 lb)
Max fuel: all	186 kg (410 lb)
Max T-O weight: all	1,224 kg (2,700 lb)
Max wing loading: all	79.9 kg/m ² (16.36 lb/sq ft)
Max power loading: SR, SRX	7.83 kg/kW (12.86 lb/hp)
TR, TRX	6.85 kg/kW (11.25 lb/hp)

PERFORMANCE:

Max level speed at S/L: SRX, TRX	143 kt (266 km/h; 165 mph)
SR, TR	161 kt (298 km/h; 185 mph)
Cruising speed, 65% power at FL70:	
SRX, TRX	130 kt (241 km/h; 150 mph)
SR, TR	148 kt (274 km/h; 170 mph)
Stalling speed, flaps down: all	44 kt (81 km/h; 50 mph)
Max rate of climb at S/L: SRX, TRX	335 m (1,100 ft)/min
SR, TR	366 m (1,200 ft)/min
Service ceiling: all	4,267 m (14,000 ft)
T-O run: SR, TR	137 m (450 ft)
SRX, TRX, on land	152 m (500 ft)
SRX, TRX, on water	244 m (800 ft)
T-O to 15 m (50 ft): SR, TR	168 m (550 ft)
SRX, TRX, on land	183 m (600 ft)
SRX, TRX, on water	290 m (950 ft)
Landing run: SR, SRX, TR, TRX, on land	137 m (450 ft)
SRX, TRX, on water	152 m (500 ft)
Landing from 15 m (50 ft):	
SR, SRX, TR, TRX, on land	168 m (550 ft)
SRX, TRX, on water	183 m (600 ft)
Range at S/L :	
at 75% power: SRX, TRX	800 n miles (1,481 km; 920 miles)
SR, TR	900 n miles (1,666 km; 1,035 miles)
at 65% power: SRX, TRX	850 n miles (1,574 km; 978 miles)
SR, TR	950 n miles (1,759 km; 1,093 miles)
at 55% power: SRX, TRX	900 n miles (1,666 km; 1,035 miles)
SR, TR	1,000 n miles (1,852 km; 1,150 miles)

CUSTOM FLIGHT

CUSTOM FLIGHT COMPONENTS LTD

RR1, Perkinsfield, Ontario L0L 2J0
Tel: (+1 705) 526 96 26
Fax: (+1 705) 526 25 29
e-mail: nstar@csolve.net
Web: www.customflightltd.com
PRESIDENT: Morgan Williams
EXECUTIVE VICE-PRESIDENT: Jeff Owen

Custom Flight Components produces the North Star and more basic Bright Star two-seat kitplanes, both modelled on the Piper Super Cub. The North Star wing can also be bought as a separate kit and retrofitted to Piper Super Cub, Aeronca Champ and Bellanca Citabria aircraft. Completions continue at low rate.

Company plans include an eight-seat aircraft to be named Galaxie, as well as four- and six-seat versions of the North Star. A further version, the Lite Star, was introduced in 2005.

CUSTOM FLIGHT LITE STAR

TYPE: Side-by-side kitbuilt; two-seat lightplane.
PROGRAMME: Prototype (C-FEFP) completed and first flown in 2005.
CUSTOMERS: Prototype only by end 2005.
COSTS: Airframe kit USD22,000; ready-to-fly USD60,000 (2006).



Custom Flight Lite Star prototype

1037946

DESIGN FEATURES: Braced high-wing monoplane with V-struts and intermediate struts each side. Tailplane braced to fin and lower fuselage. Quoted build time 600 hours.

FLYING CONTROLS: Conventional and manual. Wide Frise ailerons; no flaps. No horn balances.

STRUCTURE: Fuselage is fabric-covered welded 4130 chromoly tube. Fabric-covered wing has aluminium I-beam spars and stamped aluminium ribs.

LANDING GEAR: Tailwheel type; fixed. Two faired-in side Vs hinged to lower longerons, plus half-axles sprung with rubber under centreline. Optional skis and floats.

POWER PLANT: Engines in the range 48.5 to 74.6 kW (65 to 100 hp) can be fitted, driving a ground-adjustable fixed-pitch propeller; however prototype has 82.0 kW (110 hp) converted. Corvair motorcar engine. Fuel in two wing tanks, total capacity 76 litres (20.0 US gallons; 16.7 Imp gallons).

ACCOMMODATION: Pilot and passenger side by side.

SYSTEMS: 12 V electrical system.

DIMENSIONS, EXTERNAL:

Wing span	9.30 m (30 ft 6 in)
Length overall	6.40 m (21 ft 0 in)

WEIGHTS AND LOADINGS (Corvair engine):

Weight empty	295 kg (650 lb)
T-O weight: Max	598 kg (1,320 lb)
Max power loading	7.30 kg/kW (12.00 lb/hp)

PERFORMANCE:

Max operating speed	109 kt (210 km/h; 125 mph)
Normal cruising speed	87 kt (161 km/h; 100 mph)
Stalling speed	40 kt (73 km/h; 45 mph)
Max rate of climb at S/L	305 m (1,000 ft)/min
T-O and landing run	61 m (200 ft)
Range	350 n miles (648 km; 402 miles)
Endurance	4 h 0 min

CUSTOM FLIGHT NORTH STAR

TYPE: Tandem-seat kitbuilt.

PROGRAMME: Re-creation of Piper Super Cub, but re-engineered for additional structural strength. Prototype North Star (C-FGYD) first flew in 1991 and made its public debut that year. Offered in kit form from 1992 onwards.

CURRENT VERSIONS: **North Star:** Standard version, as described below.

Bright Star: Basic version with no flaps, single one-piece door, leaf spring steel main landing gear, square-topped fin and fuel capacity of 87 litres (23.0 US gallons; 19.2 Imp gallons); introduced in 1996, but first aircraft had not flown by late 2002; optional tricycle or tailwheel versions. Accepts engines from 74.6 kW to 134 kW (100 to 180 hp).



Prototyp Custom Flight North Star two-seat lightplane 0131799

North Star 4: Four-seat version, to be powered by engine in 108 to 194 kW (145 to 260 hp) range with a maximum take-off weight of around 1,134 kg (2,500 lb). Seeking launch customers and project reported to be on hold until North Star 6 established in production.

North Star 6: Six-seat version; maximum take-off weight of around 1,810 kg (4,000 lb). Engines between 194 and 265 kW (260 and 355 hp) can be installed.

Lite Star: See separate entry.

CUSTOMERS: Total of at least 34 kits sold by March 2006, of which 17 were then flying; in addition five of the six-seat version were under construction at the factory by late 2003.

COSTS: North Star: USD49,500; Bright Star: CAD19,602; North Star 6 USD70,000 (provisional) all excluding engine (2006).

DESIGN FEATURES: Strut-braced mainplanes; wire-braced tailplanes; raked wingtips. Easy maintenance/inspection covers. Quoted build time 1,200 hours.

Compared with Super Cub, has landing gear legs 8 cm (3 in) taller; flatter spine; squared wingtips, with ailerons moved outboard by 0.61 m (2 ft 0 in); aileron and flap chord increased 10 cm (4 in); flap span increased 0.60 m (2 ft 0 in); cockpit 6 cm (2½ in) wider. Aerofoil USA 35B.

FLYING CONTROLS: Conventional and manual. Horn-balanced rudder and elevators. Four-position flaps.

STRUCTURE: Welded 4130 chromoly tube, fabric-covered fuselage. Tubes injected with oil as anti-corrosion measure. Wing of prototype constructed of wood, but kit aircraft have I-beam spar, aluminium ribs and 2024-T3 leading-edges.

LANDING GEAR: Tailwheel type; fixed. Two faired-in side Vs, hinged to lower longerons, plus half-axes, each with hydraulic/coil-spring shock-absorber, attached to compression frame. Steerable tailwheel. Optional floats and skis. Mainwheel tyres 6.00-6 or 8.50-6; tailwheel 2.80-4 in.

POWER PLANT: One 112 kW (150 hp) Textron Lycoming O-320-E3D flat-four driving a McCauley two-blade fixed-pitch propeller. Fuel capacity 197 litres (52.0 US gallons; 43.3 Imp gallons) in two wing tanks.

ACCOMMODATION: Pilot and passenger in tandem within enclosed cockpit. Door on each side — upper half Perspex and lower half fabric-covered steel tubing. Baggage compartment reached through separate door on starboard side of fuselage.

Data estimated for Bright Star.

DIMENSIONS, EXTERNAL:	
Wing span	11.07 m (36 ft 4 in)
Wing chord, average	1.60 m (5 ft 3 in)
Length overall: North Star	6.86 m (22 ft 6 in)
Bright Star	7.16 m (23 ft 6 in)
Height overall: North Star	2.08 m (6 ft 10 in)
Bright Star	2.29 m (7 ft 6 in)
Propeller diameter	2.08 m (6 ft 10 in)
Cabin door (each): Height	0.89 m (2 ft 11 in)
Width	1.17 m (3 ft 10 in)

DIMENSIONS, INTERNAL:	
Cockpit max width	0.72 m (2 ft 4¼ in)

AREAS:	
Wings, gross	17.65 m ² (190.0 sq ft)

WEIGHTS AND LOADINGS:	
Weight empty: North Star	531 kg (1,170 lb)
Bright Star	476 kg (1,050 lb)
Baggage capacity	41 kg (90 lb)
Max T-O weight: North Star	997 kg (2,200 lb)
Bright Star	816 kg (1,800 lb)
Max wing loading: North Star	56.3 kg/m ² (11.53 lb/sq ft)
Bright Star	46.3 kg/m ² (9.47 lb/sq ft)
Max power loading (112 kW; 150 hp engine):	
North Star	8.93 kg/kW (14.67 lb/hp)
Bright Star	7.30 kg/kW (12.00 lb/hp)

PERFORMANCE:	
Max level speed	122 kt (225 km/h; 140 mph)
Max cruising speed:	
North Star: landplane	100 kt (185 km/h; 115 mph)
floatplane	85 kt (158 km/h; 98 mph)
Bright Star	87 kt (161 km/h; 100 mph)
Normal cruising speed:	
North Star	85 kt (158 km/h; 98 mph)
Stalling speed, power off:	
flaps up	35 kt (65 km/h; 40 mph)
flaps down	31 kt (57 km/h; 35 mph)
Stalling speed, full power:	
flaps up	31 kt (57 km/h; 35 mph)
flaps down	22 kt (41 km/h; 25 mph)
Max rate of climb at S/L:	
North Star	335 m (1,100 ft)/min
Bright Star	305 m (1,000 ft)/min
Service ceiling	4,880 m (16,000 ft)
T-O run (half fuel): North Star	55 m (180 ft)
Bright Star	92 m (300 ft)
Landing run: North Star	61 m (200 ft)
Bright Star	84 m (275 ft)
Range	600 n miles (1,111 km; 690 miles)

DELASTEK

DELASTEK INC

Suite 14, 2699 5^e Avenue, CP 123, Grand Mère, Québec G9T 5K7

Tel: (+1 450) 545 17 10 and (+1 819) 533 57 88

Fax: (+1 819) 533 17 10

e-mail: info@partenairdesign.com

Web: www.partenairdesign.com

PRESIDENT: Claude Lessard

VICE-PRESIDENT: Lucie McCutcheon

OPERATIONS MANAGERS:

Sylvie Hamel

Stéphane Cormier

PARTENAIR DESIGN:

91 rue O'Caïn, Suite 4, St Jean-sur-Richelieu, Québec J3B 3T8

Former Partenair company was formed in 1998 to develop the S44 Mystère, designed by Saleem Saleh and Frédéric Amblard. This evolved into the S45. In late 2003, Partenair was bought by Delastek, which intends to continue development of the S45; Partenair division operates independently of parent company in a 743 m² (8,000 sq ft) factory at Boucherville.

DELASTEK S45 MYSTÈRE

English name: Mystery

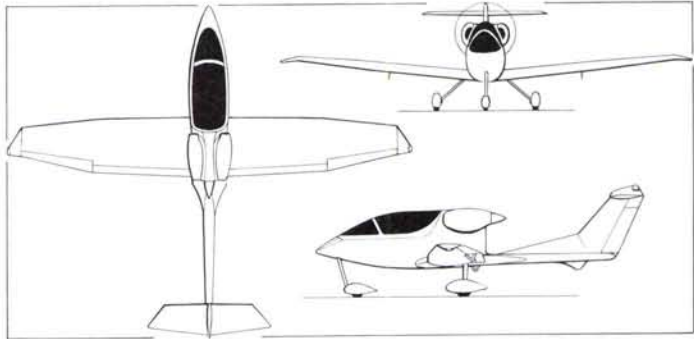
TYPE: Tandem-seat kitbuilt.

PROGRAMME: Design work on series began in 1991. Prototype (C-FZHP) first flew as Rotax 912-powered Partenair S44 on 16 November 1996, and as S45 in 1998; total 50 hours flown by July 2001, when second prototype (C-GGYI), with Textron Lycoming engine, exhibited complete, but unflown, at AirVenture, Oshkosh. First flight eventually accomplished 4 October 2001.

CURRENT VERSIONS: **Mystère Mark I:** Retrospective designation, since 2003, for original aircraft.



Delastek S45 Mystère second prototype (Paul Jackson) 1037965



Delastek (Partenair) S45 Mystère tandem-seat kitbuilt (James Goulding) 0526897

Mystère Mark II: Announced early 2003. Engine line raised 10 cm (4 in) to allow fitment of 1.78 m (5 ft 10 in) propeller; modified engine cowling. *As described.*

Mystère Mark III: Proposed retractable landing gear version, announced mid-2003.

CUSTOMERS: By end 2003, seven aircraft under construction (latest information received).

COSTS: Basic kit, excluding engine, propeller and avionics, USD27,900 (2005); can be purchased in three sub-kits.

DESIGN FEATURES: Configured to eliminate pitch-up associated with high thrust-line; horizontal stabiliser immediately above propeller slipstream counteracts thrust increases by exerting proportional pitch-down and additionally has increased effectiveness at lower airspeeds. Streamlined, pod-and-boom configuration, with T tail and sweptback fin with large fillet. Wings have constant-chord inboard sections and tapered outer panels. Engine and pusher propeller behind rear seat. Quoted build time 1,000 hours. Provision for 4 or 6° wing dihedral to be incorporated during manufacture. Wing airfoil NACA65215 on S44 and modified NACA65218 on S45. Wing washout 2° on S45.

FLYING CONTROLS: Conventional and manual. Aileron movements +30/−15°. Double slotted flaps, electrically actuated; positions 10/25/45°. Spade-type balance below each aileron. Flight-adjustable tab in elevator.

STRUCTURE: Generally of composites. Wing has C-shaped main spars plus glass fibre secondary spar at 75% chord.

LANDING GEAR: Tricycle type; fixed. Cantilever sprung main legs of 2024-T3 aluminium; trailing link nosewheel. Speed fairings on all wheels. Hydraulic Cleveland brakes. Mainwheels 5.00-5; Azusa nosewheel 11×4.00-5.

POWER PLANT: One 119.3 kW (160 hp) Textron Lycoming IO-320 flat-four, driving a Prince two-blade metal propeller with Q tips. Fuel capacity 208 litres (55.0 US gallons; 45.8 Imp gallons) of which 197 litres (52.0 US gallons; 43.3 Imp gallons) usable.

ACCOMMODATION: Two persons in tandem, beneath two-piece canopy/windscreen. Dual controls.

EQUIPMENT: Prototype S45 fitted with BRS parachute.

DIMENSIONS, EXTERNAL:	
Wing span	7.13 m (28 ft 6 in)
Wing chord: at root	1.37 m (4 ft 6 in)
at tip	0.69 m (2 ft 3 in)
Wing aspect ratio	7.6
Length overall	7.32 m (24 ft 0 in)
Height overall	2.44 m (8 ft 0 in)
Wheel track	2.29 m (7 ft 6 in)
Tailplane span	2.62 m (8 ft 7 in)
Propeller diameter	1.78 m (5 ft 10 in)
DIMENSIONS, INTERNAL:	
Cabin max width	0.76 m (2 ft 6 in)
AREAS:	
Wings, gross	9.94 m ² (107.0 sq ft)

WEIGHTS AND LOADINGS:	
Weight empty	522 kg (1,150 lb)
Baggage capacity	34 kg (75 lb)
Max T-O weight	873 kg (1,925 lb)
Max wing loading	87.84 kg/m ² (17.99 lb/sq ft)
Max power loading	7.32 kg/kW (12.03 lb/hp)
PERFORMANCE:	
Never-exceed speed (VNE)	182 kt (338 km/h; 210 mph)
Max cruising speed	139 kt (257 km/h; 160 mph)
Stalling speed	48 kt (89 km/h; 55 mph)
Max rate of climb at S/L	427 m (1,400 ft)/min
T-O and landing run	183 m (600 ft)
Max range	1,000 n miles (1,852 km; 1,150 miles)
g limits	+6/-3

DIAMOND

DIAMOND AIRCRAFT CORPORATION

1560 Crumlin Sideroad, London, Ontario N5V 1S2
Tel: (+1 519) 457 40 00
Fax: (+1 519) 457 40 21
e-mail: sales@diamondair.com
Web: www.diamondair.com
CEO: Christian Dries
MARKETING DIRECTOR: John Gauch
TECHNICAL DIRECTOR: Peter Maurer

Diamond Aircraft Corporation incorporated 12 January 1992 and established 24,625 m² (265,000 sq ft) plant at London, Ontario in June 1994, to build DV 20 Katana light aircraft for the North American market.
An experimental design, the DA20-B1 (C-GKAT), was completed in June 1996, followed by the DA20-C1 prototype in February 1997. Series production of the DA20-C1 is currently under way, augmented from March 2002 onwards by the Diamond DA40-180 Star (of which an Austrian version is in parallel production by Diamond Aircraft Industries). A DA40 with fixed-pitch propeller was introduced in 2005.

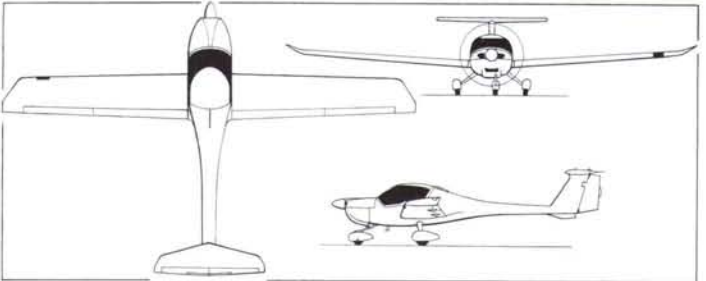
DIAMOND DA20-C1

English name: Samurai Sword
TYPE: Two-seat lightplane.
PROGRAMME: Original Austrian-built Katana revealed following first flight on 16 March 1991 of proof-of-concept LF 2000 (OE-VPX); followed by LF 2 Katana predecessor (OE-CPU, first flight December 1991); DV20 prototype (OE-AKL, first flight 17 December 1992) developed from this by Dries and Volck and was representative of production aircraft; Austrian and German certification 26 April 1993; JAR-VLA certification received later in 1993; now also certified by Canada, UK and, on 9 December 1994, USA (FAA). Second production line opened in Canada, initially for the DA20-A1; European-built aircraft designated DV20. European manufacture of the DV20 ended in mid-1996.
The current C1 version, introducing minor airframe improvements, was announced at Aero '97 at Friedrichshafen, shortly after first flight of the Canadian prototype (C-FDVA); production of this version began in early 1998, with FAA certification on 6 April that year. Canadian variant introduced some 40 minor changes, including wider cabin, electric trim and doubled electrical capacity, but is unnamed. Exports of -C1s to USA began June 1998 with seventh production aircraft.
CURRENT VERSIONS: **DA20-C1:** As described. Certified by FAA 6 April 1998. Relaunched in two versions from early 2001: **Evolution** basically equipped trainer, capable of 135 kt (250 km/h; 155 mph) cruise at 1,830 m (6,000 ft) and **Eclipse**, featuring carpets, leather seats and other interior features for private owners. Chinese CAAC certification achieved 27 July 2004.
DA20-A2: Intended to have DA20-C's improved airframe, but retain DA 20-A's 59.7 kW (80 hp) Rotax 912 flat-four engine. Not launched.
DA20-W: Based on DA20C-1 airframe, but with 78.3 kW (105 hp) Diamond GIAE 110R rotary engine. To be built in Austria by Diamond Aircraft Industries GmbH.
CUSTOMERS: Total of some 845 DV/DA20s of all versions delivered by end 2005 from Austrian and Canadian production. European production of DV 20s terminated with the



Instrument panel of Diamond DA20-C1 Eclipse N153MA in 2004 (Paul Jackson)

1042603



Diamond DA20-C1 (James Goulding)

0044445

160th aircraft in July 1996; last of 331 Canadian DA20 A1s completed in late 1998. Total of 354 C1s registered up to December 2005. Most to USA, but some to Canada and one each to New Zealand (in March 1999) and UK (July 1999). Katanas of all versions operated by training schools in Australia (one), Austria (six), Canada (11), Czech Republic (one), Finland (one), Germany (six), New Zealand (one), Sweden (one), South Africa (one), Switzerland (one), UK (two) and USA (32).
Customers include Embry-Riddle Aeronautical University, which has leased 35 C1s to fulfil a contract to provide basic flight training of USAF cadet pilots at the Air Force Academy in Colorado Springs. Total of 58 DA20-C1s delivered in 2004 and 54 in 2005.



Diamond DA20-C1 Eclipse from Canadian production

1153777

COSTS: Evolution USD128,900; Eclipse USD139,990 (2004).

DESIGN FEATURES: Conventional, mid-wing, T-tail monoplane of composites construction.

Wing section Wortmann FX-63-137/20; dihedral 4° at root, 27° at tip; sweepback 1°; incidence, 2° 30'. Fin sweepback 57°; tailplane incidence -2°.

FLYING CONTROLS: Conventional and manual. Ailerons and elevators are operated by push-pull tubes, rudder by cables; electrically actuated spring bias provides elevator trimming; electrically actuated flaps. Control surface movements: ailerons +16°/-13°; elevator +25°/-15°; rudder ±30°; flaps 15° for T-O, 45° landing.

STRUCTURE: Fuselage, with integral vertical fin, is mostly of GFRP construction with local CFRP reinforcement in high-stress areas, comprising two half-shells which are bonded together and incorporate transverse bulkheads in the cabin/centre-section area and three ring bulkheads in the tailcone. Wings comprise I-section spar of GFRP, with ribs providing mounting surfaces for control tubes and bellcranks; CFRP spar caps; centre section shear web is foam and fibre; wing skins are of GFRP/PVC foam/GFRP sandwich construction, as are the rudder and horizontal tail surfaces. Flaps and ailerons of GFRP.

LANDING GEAR: Fixed tricycle type, with fuselage-mounted cantilever self-sprung aluminium leg on each main unit and elastomeric suspension on nose leg; latter offset to starboard by 8 cm (3 in). Steering is provided by differential braking of the mainwheels and friction-damped castoring nosewheel. Speed fairings on all three wheels standard on Eclipse, optional on Evolution.

POWER PLANT: One 93 kW (125 hp) Teledyne Continental IO-240-B flat-four driving a Sensenich W69EK7-63 two-blade wood and composites propeller (W69EK-63 on first 149 aircraft). Alternatively, Hoffman HO-14HM-175-157 two-blade propeller. Fuel capacity 92.7 litres (24.5 US gallons; 20.4 Imp gallons), of which 91 litres (24.0 US gallons; 20.0 Imp gallons usable); oil capacity 5.7 litres (1.5 US gallons; 1.25 Imp gallons).

ACCOMMODATION: Two seats side by side, with baggage space to rear; leather seats and inertia reel safety harnesses optional. Canopy hinged at rear to open upward.

SYSTEMS: Electrical system includes 12 V 40 A alternator and 12 V 240 Ah battery.

AVIONICS: *Comms*: Eclipse has Garmin GMA 340 audio panel, GNS 430 comm/nav/GPS, GI 106A, and GTX 327 transponder, all as standard; other avionics to customer's choice include GNS 420, GPS 150XL, Bendix/King KMD 150 GPS and KI 208 VOR. Evolution has Bendix/King KX 155 nav/com, KI 209 VOR/LOC/GS indicator, KT 76C transponder and PM501 intercom as standard. AvPac 1 adds KLX 135A GPS/com and PMA 6000 audio panel/intercom with marker beacon receiver; AvPac 2 adds items as for AvPac 1, but with glideslope for KX 155.

Flight: Optional S-TEC 30 two-axis autopilot and slaved HIS in Eclipse.

EQUIPMENT: Evolution options include sheepskin seats, deluxe carpet, inertia reel harnesses, integral instrument lighting, electro luminexent panel floodlight, pop-out vent windows, engraved aluminium throttle quadrant cover plates, external power receptacle, engine heater system, and heavy duty battery.

DIMENSIONS, EXTERNAL:

Wing span	10.87 m (35 ft 8 in)
Wing aspect ratio	10.2
Length overall	7.165 m (23 ft 6 in)
Height overall	2.18 m (7 ft 2 in)
Tailplane span	2.65 m (8 ft 8 1/4 in)
Wheel track	1.90 m (6 ft 2 3/4 in)
Wheelbase	1.72 m (5 ft 7 3/4 in)
Propeller diameter	1.75 m (5 ft 9 in)

AREAS:

Wing area, gross	11.61 m ² (125.0 sq ft)
------------------	------------------------------------

WEIGHTS AND LOADINGS:

Weight empty	529 kg (1,166 lb)
Baggage capacity	20 kg (44 lb)
Max T-O weight: EASA	750 kg (1,653 lb)
FAA	800 kg (1,763 lb)
Max wing loading (EASA)	64.6 kg/m ² (13.22 lb/sq ft)
Max power loading (EASA)	8.03 kg/kW (13.20 lb/hp)

PERFORMANCE:

Never-exceed speed (VNE)	159 kt (294 km/h; 183 mph)
Cruising speed at 75% power at FL60	140 kt (259 km/h; 161 mph)
Manoeuvring speed	106 kt (196 km/h; 122 mph) CAS
Stalling speed: clean	47 kt (87 km/h; 54 mph)
in landing configuration	38 kt (71 km/h; 44 mph)
Max rate of climb at S/L	305 m (1,000 ft)/min
Service ceiling	5,365 m (17,600 ft)
T-O run	337 m (1,105 ft)
T-O to 15 m (50 ft)	448 m (1,470 ft)
Landing from 15 m (50 ft)	454 m (1,490 ft)
Landing run	390 m (1,280 ft)
Range, 45 min reserves: Eclipse	410 n miles (759 km; 471 miles)

DIAMOND DA40-180 DIAMOND STAR

TYPE: Four-seat lightplane.

PROGRAMME: Development by Diamond in Austria. Production of Lycoming-engined variant transferred to Canada in 2002.

CURRENT VERSIONS: **DA40-180**: Baseline version with Lycoming IO-360 engine. Preparation for Canadian assembly (which see) began September 2001, and first from this source (C-GDFC, c/n 40201) delivered on 28 March 2002 to Academy Air Services, Ontario.

DA40: Powered by 99 kW (133 hp) Thielert Centurion 1.7 turbo-diesel; Austrian-built.

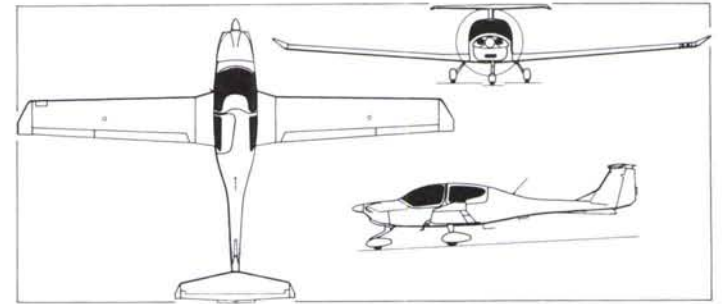
DA40-180 FP: Fixed-pitch propeller version; launched at Sun 'n' Fun, Lakeland, Florida, April 2004 certified by FAA (as DA 40F) 15 July 2005, following EASA on 15 April 2005. Features Sensenich 76EM8S10-0-63 Textron Lycoming O-360-A4M engine with two-blade fixed-pitch metal propeller, optional wheel fairings, single-cylinder EGT/CHT gauge; payload with max fuel 308 kg (680 lb); cruising speed more than 140 kt (259 km/h, 161 mph); max rate of climb at S/L more than 274 m (900 ft)/min; T-O to 15 m (50 ft) 411 m (1,350 ft).

DA40XL: Improved '2007 model' announced at NBAA Convention, Orlando, Florida, October 2006. Prototype C-FJPC (c/n 40665). Changes include 'scimitar' propeller, winglets and tuned exhaust, adding up to 12 kt (22 km/h; 14 mph) to top speed; additional



Winglet-equipped Diamond Star XL at its public debut (Paul Jackson)

1158861



Diamond DA40-180 Diamond Star (Lycoming IO-360) (Paul Jackson)

0092123

50 kg (110 lb) on MTOW; increased fuel as standard; GFC 700 autopilot; Avidyne TCAS; and redesigned interior and external paint scheme.

CUSTOMERS: Diamond Canada registered its 250th Diamond Star (N132DS) in November 2004.

COSTS: DA40-180 FP: Basic USD179,900; with Garmin G1000 package USD214,800; DA40-180: with Bendix/King avionics package USD194,600; with Bendix/King IFR avionics USD206,250; with Garmin avionics package USD196,600; with Avidyne FlightMax Entegra package USD236,500; with Garmin G1000 package USD229,500 (all 2004). DA40XL: USD329,800 (2007).

The description of the DA40D (which see) applies also to the DA40-180 except as follows:

POWER PLANT: One 134 kW (180 hp) Textron Lycoming IO-360-M1A flat-four with Lasar electronic ignition and self-adapting inlet cooling, driving an MTV-12-B/180-17 three-blade constant-speed (hydraulic) composites propeller; MTV-12-B/183-59b for DA40XL. Fuel in two wing tanks, standard capacity 156 litres (41.2 US gallons; 34.3 Imp gallons), of which 152 litres (40.1 US gallons; 33.4 Imp gallons) usable; optional 185 litres (48.8 US gallons; 40.7 Imp gallons), of which 181 litres (47.8 US gallons; 39.8 Imp gallons) usable. DA40XL fuel 182 litres (48.1 US gallons; 40.0 Imp gallons).

SYSTEMS: 28 V electrical system includes 70 A alternator.

AVIONICS: Choice of Bendix/King, Avidyne or Garmin packages.

Comms: Bendix/King Standard package includes KX 155 nav/com, KT 76A transponder with blind encoder, and PM 1000 II intercom; Deluxe package substitutes KX 155A for KX 155 and KT 76C for KT 76A, and adds KX 165A nav/com/glideslope, and KMA 28S audio panel with intercom and marker beacon receiver in place of PM 1000 II. Garmin Standard package includes GNS 430 nav/com/GPS/glideslope, GTX 327 transponder with blind encoder, and GMA audio panel with intercom. Deluxe package adds second GNS 430. GNS 530 nav/com/GPS optional in exchange for GNS 430.

Flight: Bendix/King Standard package includes KLN 94 GPS moving map and KI 208 VOR/LOC. Deluxe package substitutes KLN 94 GPS for VFR unit, and adds KI 209A VOR/GS. Further options include KAP 140 two-axis autopilot with altitude hold/preselect and electric pitch trim, KCS 55A slaved HSI (exchange for KI 209A) and MD-41 GPS/nav/annunciator. Garmin Standard package includes GI 106A VOR/LOC/GPS/GS indicator. Deluxe package adds second GI 106A. Further options include Bendix/King KAP 140 two-axis autopilot with altitude hold/preselect and electric pitch trim, KCS 55A slaved HSI (exchange for GI 106A), MD 41 GPS/nav/annunciator and Goodrich WX-500 Stormscope.

Instrumentation: Vision Microsystem VM 1000 engine control system comprising manifold pressure gauge, tachometer, engine hour meter, oil pressure gauge, oil/cylinder head temperature indicators, fuel flow indicator, ammeter and voltmeter; compass, ASI, altimeter, VSI, turn co-ordinator, artificial horizon, DG, OAT gauge, chronometer and alternate static port, all standard.

Avidyne FlightMax Entegra glass cockpit, with IFR-certified 26 cm (10.4 in) colour LCD PFD, EX5000 MFD, and E-max Total Engine Management System, introduced as an option in August 2003. Garmin G1000 integrated glass cockpit available as an option from first quarter 2004, comprising large format sunlight readable 25.4 cm (10 in) PFD and MFD; audio control system; dual integrated radio modules providing WAAS-capable IFR GPS, VHF/ILS and VHF comm functions with 8.33 kHz channel spacing; Mode S transponder with Traffic Information Service; solid state AHRS; digital air data computer; interface with Bendix/King KAP 140 two-axis autopilot; and optional weather and terrain data.

DIMENSIONS, EXTERNAL:

Wing span	11.63 m (38 ft 2 in)
-----------	----------------------

WEIGHTS AND LOADINGS:

Weight empty	740 kg (1,631 lb)
Baggage capacity: normal	35 kg (77 lb)
optional	45 kg (100 lb)

For details of the latest updates to *Jane's All the World's Aircraft* online and to discover the additional information available exclusively to online subscribers please visit
jawa.janes.com



Canadian-built Diamond DA40-180 Diamond Star

1151721

Max T-O weight: DA40	1,150 kg (2,535 lb)	Stalling speed, flaps down: all	49 kt (91 km/h; 57 mph)
DA40XL	1,200 kg (2,645 lb)	Max rate of climb at S/L: DA40	326 m (1,070 ft)/min
Max landing weight: DA40	1,092 kg (2,407 lb)	DA40XL	341 m (1,120 ft)/min
DA40F	1,150 kg (2,535 lb)	Max certified altitude: all	5,000 m (16,400 ft)
Max wing loading	85.2 kg/m ² (17.45 lb/sq ft)	T-O run, DA40XL	314 m (1,030 ft)
Max power loading	8.58 kg/kW (14.10 lb/hp)	T-O to 15 m (50 ft): DA40	351 m (1,150 ft)
PERFORMANCE:		DA40XL	348 m (1,140 m)
Never-exceed speed (VNE)	173 kt (320 km/h; 199 mph) IAS	Range, 45 min reserves: DA40: standard fuel	570 n miles (1,055 km; 655 miles)
Max level speed: DA40	147 kt (272 km/h; 169 mph)	optional fuel	740 n miles (1,370 km; 851 miles)
Cruising speed: at 75% power at 1,220 m (4,000 ft): DA40	145 kt (269 km/h; 167 mph)	DA40XL: 75% power	720 n miles (1,333 km; 828 miles)
DA40XL	150 kt (278 km/h; 173 mph)	55% power	785 n miles (1,453 km; 903 miles)
at 50% power at FL100: DA40	120 kt (222 km/h; 138 mph)		

DREAM

DREAM AIRCRAFT INC
565 Maisonneuve, Granby, Québec J2G 3H5
Tel: (+1 450) 372 99 29
Fax: (+1 450) 372 81 22
e-mail: info@dreamaircraft.com
Web: www.dreamaircraft.com
VICE-PRESIDENT: Yvan Desmarais
SALES MANAGER: Luc Prémont

Dream's debut as an aircraft manufacturer was at the April 2003 Sun 'n' Fun festival at Lakeland, Florida. By the following year, it was able to show a second prototype of the Tundra lightplane more representative of the production version. The company is a division of specialist engineering firm D&G Inc, which has a 2,790 m² (30,000 sq ft) manufacturing facility.

DREAM TUNDRA

TYPE: Four-seat kitbuilt.
PROGRAMME: Construction of the prototype started in 1998 and first flew (C-GIPN) at Bromont on 12 May 2001; experimental certification 7 June 2001; first flight from floats 3 October 2001; first public display at Sun 'n' Fun in April 2003 (when it had accumulated 120 hours) and, later, at AirVenture, Oshkosh, July 2003. Second prototype flown April 2004 (C-GAGH), displaying detail changes, including spring cantilever aluminium landing gear, double floor, thinner tailplane and rudder, redesigned engine cowlings and higher-powered IO-360 engine; by February 2006 two prototypes had accumulated 625 flying hours. In November 2005, FAA approval under 51 per cent rule achieved.



Second prototype Dream Tundra (Paul Jackson)

1159104

CUSTOMERS: By April 2004, three sold and first set of wing and tail components had been delivered; 13 kits in production by June 2005. First customer-built aircraft (C-FFTI) flown 6 September 2005.

COSTS: Kit CAD43,990 (tailwheel) or CAD46,980 (nosewheel) (2006), excluding engine, propeller and avionics.

DESIGN FEATURES: Intended to carry four adults and baggage from short and semi-prepared runways. Designed on 3-D software and constructed of precision-drilled aluminium components. Wings braced by V struts; downturned tips; 2° washout; modified Riblett 660.15 aerofoil. Quoted build time 1,000 hours.

FLYING CONTROLS: Conventional and manual. Large, Horn-balanced elevators with flight-adjustable trim tab to port. Horn-balanced rudder. Four-position (0, 15, 25, 40°) Fowler flaps.

STRUCTURE: Aluminium throughout, except composites wing-, fin- and tailplane tips.

LANDING GEAR: Fixed; option of nosewheel or tailwheel type. Cantilever spring aluminium mainwheel legs. (Prototype has tailwheel and two faired-in side Vs hinged to lower longerons, plus half-axes spring under centreline with bungee cord). Grove mainwheels with 8.50x6 or 8.00-6 tyres; solid, steerable tailwheel. Optional floats or skis.

POWER PLANT: One 149 kW (200 hp) Textron Lycoming IO-360 flat-six (134 kW; 180 hp O-360-A in prototype), driving a Sensenich 76EM8-0-57 (prototype) or Hartzell two-blade, metal propeller; engines upto 175 kW (235 hp) can be fitted. Total fuel 220 litres (58.0 US gallons; 48.3 Imp gallons) in two wing tanks, of which 204 litres (53.9 US gallons; 44.9 Imp gallons) usable.

ACCOMMODATION: Four persons in two side-by-side pairs. Baggage space to rear. Upward-hinged door each side; cargo door on port fuselage side.

DIMENSIONS, EXTERNAL:	
Wing span	10.97 m (36 ft 0 in)
Wing chord (constant)	1.55 m (5 ft 1 in)
Wing aspect ratio	7.1
Length overall	7.77 m (25 ft 6 in)
Height overall	3.05 m (10 ft 0 in)
Tailplane span	3.23 m (10 ft 7 in)
Wheel track	2.44 m (8 ft 0 in)
Propeller diameter (Hartzell)	2.06 m (6 ft 9 in)

DIMENSIONS, INTERNAL:	
Cabin: Length	2.84 m (9 ft 4 in)
Max width	1.12 m (3 ft 8 in)

AREAS:	
Wings, gross	17.06 m ² (183.6 sq ft)
Horizontal tail surfaces	3.62 m ² (39.0 sq ft)

WEIGHTS AND LOADINGS (L: landplane, F: floatplane):	
Weight empty: L	658 kg (1,450 lb)
F	767 kg (1,692 lb)
Max fuel weight: L, F	158 kg (348 lb)
Max T-O weight: L	1,156 kg (2,550 lb)
F	1,270 kg (2,800 lb)

Max wing loading	67.8 kg/m ² (13.89 lb/sq ft)
Max power loading	8.62 kg/kW (14.17 lb/hp)
PERFORMANCE:	
Never-exceed speed (VNE): L, F	140 kt (259 km/h; 161 mph)
Cruising speed: max: L	122 kt (226 km/h; 140 mph)
F:	109 kt (201 km/h; 125 mph)
at 75% power: L	115 kt (213 km/h; 132 mph)
F:	103 kt (190 km/h; 118 mph)
Stalling speed: flaps up: L	37 kt (69 km/h; 43 mph)
F	46 kt (84 km/h; 52 mph)
flaps down: L	26 kt (49 km/h; 30 mph)
F	40 kt (72 km/h; 45 mph)

FOUND

FOUND AIRCRAFT CANADA INC

RR# 2, Site 12, Box 10, Parry Sound Airport, Parry Sound, Ontario P2A 2W8
 Tel: (+1 705) 378 05 30
 Fax: (+1 705) 378 12 64
 e-mail: sales@foundair.com
 Web: www.foundair.com
 SALES MANAGER: Andrew Hamblin

The present company of this name was established in 1996 to reinstate production of the FBA-2 Bush Hawk, beginning deliveries in mid-2000. An XP version was introduced in 2001 and at least 25 have now been built. The company operates from two facilities totalling 2,322 m² (25,000 sq ft) with access to both a hard runway and a freshwater lake.

FOUND FBA-2C BUSH HAWK

TYPE: Five-seat utility transport.
 PROGRAMME: Original Found FBA-2C first flew on 9 May 1962. Production numbered 27, plus five improved Centennial 100s before company ceased trading. In March 2006, eight FBA-2Cs and three Centennials were active in North America.
 Prototype of current FBA-2C1 (C-FSVD), converted from an existing aircraft with IO-540-D engine, and other improvements, flew at Georgian Bay Airport, Ontario, in November 1996 and completed test flying, on wheels and floats, during 1998 and 1999. New production was due to start in July 1997 but programme slipped; preproduction aircraft C-GDWO (c/n 28; IO-540-L engine) made first flight October 1998 and certified 5 March 1999; was followed by C-GDWQ in 1999; initial production Bush Hawk C-GDWS (c/n 30) flew 2 March 2000. FAA certificate A7EA reinstated 10 March 2000, covering both FBA-2C and FBA-2C1; uprated (224 kW; 300 hp) version added 1 May 2001.
 CURRENT VERSIONS: **FBA-2C Bush Hawk-260:** 194 kW (260 hp) version; no longer available.
FBA-2C1 Bush Hawk-XP: 224 kW (300 hp) version demonstrator C-GDWC (c/n 31) built 2000; available from 2001.

FBA-2C2 Bush Hawk-XP: Introduced 2004; Canadian certificate issued 14 May 2004 and FAA 11 January 2005. Offers increased maximum take-off weight and Fowler flaps. Earlier versions can be modified to this standard.

Description and data apply to FBA-2C2 Bush Hawk-XP unless otherwise stated.
 CUSTOMERS: By April 2006, 32 had been built. Initial production aircraft exported to USA 24 May 2001. Recent customers include the US Fish and Wildlife Agency.
 COSTS: Bush Hawk-XP USD325,000 on wheels; USD412,750 on amphibious floats and USD373,750 on straight floats; hourly operating cost CAD63.40 (2005).
 DESIGN FEATURES: Fully corrosion-proofed, all-metal construction for operation over all terrain.

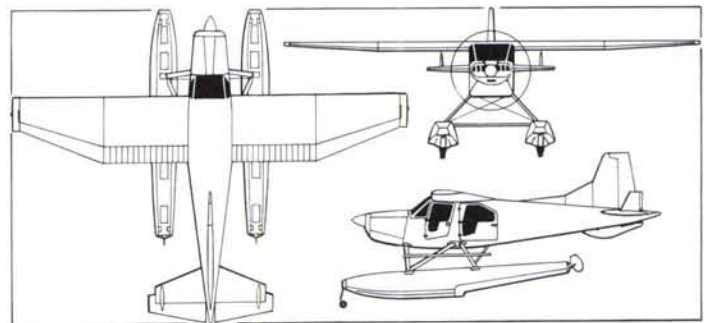
High wing with constant chord to mid-span; outer panels unswept, with sharply swept forward trailing-edges. Sweptback fin with two-stage fillet; mid-mounted tailplane. Floatplane directional stability enhanced by underfin and auxiliary fins above and below tailplane at three-quarters span.

FLYING CONTROLS: Conventional and manual. Horn-balanced rudder and elevators. Fowler flaps extend to 30°. Control surface deflections: aileron +18/-12°; elevator +29.5/-21.5°;

Max rate of climb at S/L: L	305 m (1,000 ft)/min
F	183 m (600 ft)/min
Service ceiling	4,265 m (14,000 ft)
T-O run: L	122 m (400 ft)
F	396 m (1,300 ft)
Landing run: L	152 m (500 ft)
Range: L	584 n miles (1,083 km; 673 miles)
F	532 n miles (986 km; 613 miles)
Endurance: L, F	5 h 12 min
g limits: L, F	+3.8/-1.7



Found FBA-2C1 Bush Hawk-XP on wheel landing gear (Paul Jackson) 1159046



Found FBA-2C1 Bush Hawk-XP five-seat utility transport (James Goulding) 1042473

stabiliser +6/-4°; rudder 24° either side of neutral. Six vortex generators ahead of each aileron; optional retrofittable package comprising 72 along span, to be fitted in conjunction with two 30 cm (1 ft) winglets available since February 2006, offering improved slow speed control and more docile stall characteristics; allows removal of lower component of tailplane finlets, as previously required for floatplane.

STRUCTURE: Aluminium-covered steel tube front fuselage and semi-monocoque rear fuselage. Deep-section, low-drag, all-aluminium wing.

LANDING GEAR: Fixed. Prototype, preproduction and first production aircraft have tailwheel configuration; all following landplanes have tricycle layout with optional tailwheel layout. Sprung steel main legs with urethane shock-absorbers. Mainwheels 8.00-6, but 66 cm (26 in) 8.50-10 and 76 cm (30 in) Tundra tyres being evaluated. Steerable tailwheel. Other options include EDO 628-2960 or 249A-2870 (modified) floats, Wipaire 3450 floats or amphibious floats or Aerocet 3500 floats and Federal C-3200 or C-3600 retractable skis.



Extended wingtips, available from 2006, demonstrated by Found FBA-2C1 Bush Hawk-XP (Paul Jackson)

1159047

POWER PLANT: One 224 kW (300 hp) Textron Lycoming IO-540-L1C5 flat-six engine, driving a Hartzell HC-C3YR-1RF/F8468A-2R constant-speed three-blade metal propeller; Diesel engine (possibly 231 kW; 310 hp Thielert) under consideration for African markets. Fuel in two wing tanks, total capacity 378 litres (99.8 US gallons; 83.1 Imp gallons) of which 372 litres (98.3 US gallons; 81.8 Imp gallons) usable. Oil capacity 9.5 litres (2.5 US gallons; 2.1 Imp gallons).

ACCOMMODATION: Pilot and co-pilot, plus three passengers in cabin, with crew entrance through forward-hinged doors on each side of fuselage. Individual aft folding seats. Rear cabin typically holds four 204 litre (54.0 US gallon; 45.0 Imp gallon) drums and has large, forward-hinged door on each side; door sills are flush with floor; doors swing 180° to allow easy loading. Alternatively, one stretcher and attendant in rear cabin. Camera hatch can be fitted in cabin floor.

SYSTEMS: 24 V 10 Ah battery, 28 V 70 A alternator.

AVIONICS:

As customer's preference.

DIMENSIONS, EXTERNAL:

Wing span: standard	10.97 m (36 ft 0 in)
option	11.58 m (38 ft 0 in)
Wing aspect ratio	7.2
Length overall: landplane	7.98 m (26 ft 2 in)
floatplane	8.38 m (27 ft 6 in)
Height overall: landplane	2.77 m (9 ft 1 in)
floatplane	3.68 m (12 ft 1 in)
Propeller diameter	2.13 m (7 ft 0 in)
Cabin door: Max height	1.02 m (3 ft 4 in)
Max width	0.97 m (3 ft 2 in)

DIMENSIONS, INTERNAL:

Cabin (including baggage compartment):	
Length	4.01 m (13 ft 2 in)
Max width	1.12 m (3 ft 8¼ in)
Max height	1.27 m (4 ft 2 in)
Volume	3.40 m³ (120 cu ft)

AREAS:

Wings, gross	16.72 m² (180.0 sq ft)
--------------	------------------------

WEIGHTS AND LOADINGS:

Weight empty: landplane	862 kg (1,900 lb)
floatplane	1,021 kg (2,250 lb)
Baggage capacity	113 kg (250 lb)
Max T-O weight: landplane	1,587 kg (3,500 lb)
floatplane	1,723 kg (3,800 lb)
Max wing loading: landplane	94.9 kg/m² (19.44 lb/sq ft)
floatplane	103.1 kg/m² (21.11 lb/sq ft)
Max power loading: landplane	7.10 kg/kW (11.67 lb/hp)
floatplane	7.71 kg/kW (12.67 lb/hp)

PERFORMANCE:

Never-exceed speed (VNE)	158 kt (292 km/h; 181 mph) CAS
Cruising speed at 75% power:	
landplane	150 kt (278 km/h; 173 mph)
floatplane	130 kt (241 km/h; 150 mph)
Stalling speed, power off:	
flaps up: landplane	57 kt (106 km/h; 66 mph)
floatplane	58 kt (108 km/h; 67 mph)
flaps down: landplane	52 kt (97 km/h; 60 mph)
floatplane	54 kt (100 km/h; 62 mph)
Max rate of climb at S/L:	
landplane	341 m (1,120 ft)/min
floatplane	320 m (1,050 ft)/min
Service ceiling: landplane	5,485 m (18,000 ft)
floatplane	4,570 m (15,000 ft)
T-O run: landplane	229 m (750 ft)
floatplane	366 m (1,200 ft)
T-O to 15 m (50 ft): landplane	406 m (1,330 ft)
floatplane	580 m (1,900 ft)
Range with max fuel:	
landplane	757 n miles (1,402 km; 871 miles)
floatplane	652 n miles (1,207 km; 750 miles)
Endurance	7 h 30 min

INNOVATOR

INNOVATOR TECHNOLOGIES

Box 17, Site 17, RR5, Calgary, Alberta T2P 2G6

Tel: (+1 403) 669 31 01, 936 54 23

e-mail: mosquito@innovatortech.ca

Web: www.innovatortech.ca

DIRECTOR/DESIGNER: John Uptigrove

Having originally been marketed as an open frame helicopter, the Innovator Mosquito was relaunched at Sun 'n' Fun, April 2004, with an enclosed cabin and structure as the Mosquito XE and XEL. A turbine-powered version is planned.

INNOVATOR MOSQUITO

TYPE: Single-seat ultralight helicopter kitbuilt.

PROGRAMME: First flight 2000 in form of unenclosed frame with tripod landing gear; total 130 hours of airborne time by July 2003. Holds Canadian amateur-builder's certificate of airworthiness. In March 2004, a prototype of an enclosed version, subsequently named Mosquito XE, was flown. This retained the tricycle landing gear, but a production-representative machine with twin skids was shown at the public launch at Sun 'n' Fun, Lakeland, Florida in April 2004. A turbine version powered by a Solar engine was due to fly in mid-2006.

CURRENT VERSIONS: **Mosquito Air:** Original, unenclosed version.

Mosquito XE: Enclosed version; marketed from 2004; meets FAA Experimental criteria.

Mosquito XEL: Ultralight float-equipped version of XE.

CUSTOMERS: By April 2006, 43 kits had been sold of which 28 were of the original unenclosed version; 15 had flown by that date.

COSTS: Kit USD28,500; or USD26,500 upon evidence of helicopter flying instruction; enclosed version; unenclosed version USD24,000 (2006). Floats USD1,000 extra.

DESIGN FEATURES: To FAR Pt 103 regulations. Vertically mounted engine driving main rotor via toothed belt as second-stage reduction gear. Tailboom supported by V strut.

Semi-rigid main rotor. Unique control system: main rotor control from floor-mounted stick and collective through control mixer at base of main mast, then through push tubes in main mast to base of swashplate; last-mentioned is contained within mast and supported by a pushrod in rotor shaft. Control rods each side of pushrod transmit inputs through rotor shaft to control lever on top of main shaft and down to blade pitch horns through pitch links. Tail rotor controlled by foot pedals through Bowden cable to actuating lever on tail rotor shaft.



Unenclosed version of Innovator Mosquito (Paul Jackson)

1159048



Prototype Innovator Mosquito XE Turbine before installation of engine and rotors (Paul Jackson)

1159049

Main rotor speed 520 rpm; tail rotor 2,500 rpm. Quoted build time 200 hours.

STRUCTURE: Frame of 6061-T6 aluminium; glass fibre tripod landing gear replaced by twin skids from 2004; carbon fibre tailboom and V struts. Composites cabin. Main rotor blades constructed upon aluminium spar bonded to wrapped aluminium sheet skin; foam sealer plugs both ends. Titanium main gearbox; aluminium fuel tanks.

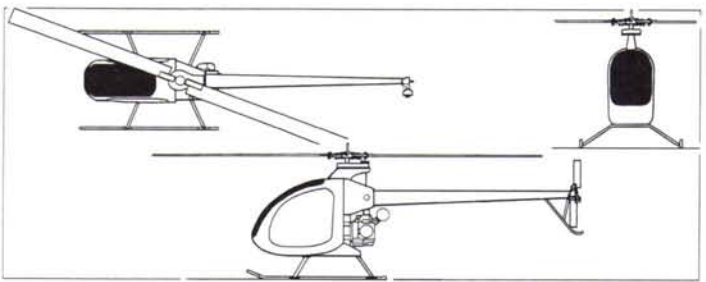
LANDING GEAR: XE has twin skids of bolted metal tube with wire bracing. Floats optional.

POWER PLANT: One 44.7 kW (60 hp) Zanzottera MZ202 two-cylinder two-stroke with electric starter and directly attached primary reduction gear. Centrifugal clutch and overspeed provision during autorotation. Flexible couplings and flexible driveshaft transmit power to tail rotor. Total fuel 19 litres (5.0 US gallons; 4.2 Imp gallons) in two tanks in Mosquito and Mosquito XEL; 45 litres (12.0 US gallons; 10.0 Imp gallons) in Mosquito XE.

SYSTEMS: 12 V DC battery, 180W alternator.

DIMENSIONS, EXTERNAL (A: Mosquito; B: Mosquito XE; C: Mosquito XEL):

Main rotor diameter: A	5.49 m (18 ft 0 in)
B, C	5.94 m (19 ft 6 in)
Tail rotor diameter: all	1.02 m (3 ft 4 in)
Length: frame: all	4.88 m (16 ft 0 in)
overall (excl main rotor): A	6.10 m (20 ft 0 in)
Max width: all	1.83 m (6 ft 0 in)



Innovator Mosquito XE (Paul Jackson)

1128973

Height overall: A	2.11 m (6 ft 11 in)
B, C	2.13 m (7 ft 0 in)
WEIGHTS AND LOADINGS:	
Weight empty: A	115 kg (254 lb)
B	135 kg (298 lb)
C	142 kg (312 lb)
Max T-O weight: A	240 kg (530 lb)
B, C	277 kg (610 lb)

MURPHY

MURPHY AIRCRAFT MANUFACTURING LTD

Unit 1, 8155 Aitken Road, Chilliwack, Vancouver, British Columbia V2R 4H5
 Tel: (+1 604) 792 58 55
 Fax: (+1 604) 792 70 06
 e-mail: mursales@murphyair.com
 Web: www.murphyair.com
 PRESIDENT: Darryl Murphy
 SALES MANAGER: Stéphane Marois
 MARKETING MANAGER: Dean Mueller

Formed in 1985, the company moved from initial 745 m² (8,000 sq ft) plant to new 4,925 m² (53,000 sq ft) premises in 1995 to accommodate increase in business. In mid-2000, Murphy opened a fast-build factory in the Philippines, which employs 40 staff to produce Mooses and float kits; by end 2002, five aircraft per month were being delivered. Subassemblies are built from Canadian parts which are then shipped back.

In 2005 the Canadian workforce numbered 22.

On 31 December 2004, more than 210 Murphy kitbuilt aircraft were currently registered in Canada.

MURPHY RENEGADE II

TYPE: Tandem-seat ultralight biplane kitbuilt.

PROGRAMME: Prototype Renegade II made first flight May 1985; first kits became available September that year. Ready assembled aircraft, plans and kits are available.

CUSTOMERS: By end-2005, 702 Renegade IIs and Renegade Spirit kits had been sold.

COSTS: Quick-build kit USD14,040; full materials kit USD9,880; partial parts kit USD3,744; plans USD376 (2006 prices).

DESIGN FEATURES: Sporting biplane of classic configuration. Conforms to TP101.41 ultralight regulations in Canada and some European countries. Optional wingtip extensions (for countries such as UK requiring lower wing loadings) increase gross area to 15.83 m² (170.4 sq ft). Optional extended wings and rounded tips; optional floats and parachute.

NACA 23012 wing section; 10° sweepback on upper wings; 3° dihedral on non-swept lower wings. Angle of incidence for both wings of 4°.

Kits in four standards ranging from partial parts kit to 300/400 working hour quick-build kit with all parts premanufactured plus partly assembled fuselage, wings and engine mounting.

FLYING CONTROLS: Conventional and manual. Differentially rigged Frise ailerons.

STRUCTURE: Fabric-covered aluminium tubing; rear fuselage top-decking of preformed glass fibre; two-spar wings have aluminium sheet leading-edges; glass fibre wingtips optional; wire-braced tail assembly.

LANDING GEAR: Tailwheel type; fixed. Two faired-in side Vs hinged to lower longerons, plus half-axes sprung under centreline with bungee cord. Tailwheel steerable.

POWER PLANT: One 34.0 kW (45.6 hp) Rotax 503 UL-1V two-cylinder two-stroke engine standard; 37.0 kW (49.6 hp) twin-carburettor Rotax 503 UL-2V optional. Alternative engines up to 59.6 kW (80 hp) can be fitted, including Rotax 582 and Teledyne Continental O-65, O-75 and O-85. Fuel capacity 53 litres (14.0 US gallons; 11.6 Imp gallons).

DIMENSIONS, EXTERNAL:

Wing span (normal): upper	6.48 m (21 ft 3 in)
lower	6.05 m (19 ft 10 in)
Length overall	5.61 m (18 ft 5 in)
Height overall	2.08 m (6 ft 10 in)

AREAS:

Wings, gross

WEIGHTS AND LOADINGS:

Weight empty	170–236 kg (375–520 lb)
Max T-O weight, Rotax 503	431 kg (950 lb)

PERFORMANCE (Rotax 503 engine and two crew):

Never-exceed speed (VNE)	104 kt (193 km/h; 120 mph)
Max level speed at 305 m (1,000 ft)	70 kt (129 km/h; 80 mph)
Cruising speed at 75% power	56 kt (105 km/h; 65 mph)
Stalling speed, power off	33 kt (61 km/h; 38 mph)
Max rate of climb at S/L	152 m (500 ft)/min
T-O and landing run	92 m (300 ft)
Range at 75% power	197 n miles (365 km; 227 miles)

MURPHY RENEGADE SPIRIT

TYPE: Tandem-seat ultralight biplane kitbuilt.

PROGRAMME: First flight (C-IJLW) 6 May 1987; kit production began a month later.

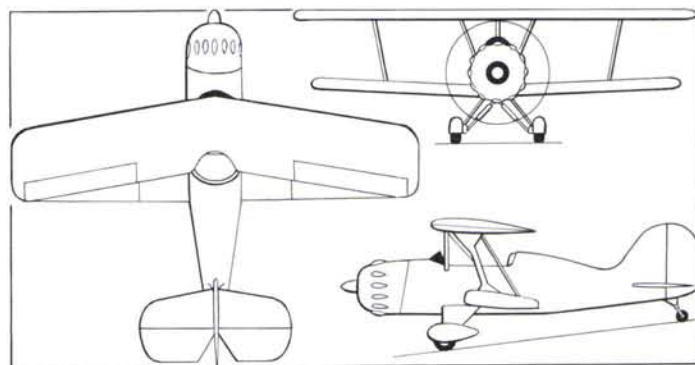


Murphy Renegade Spirit (Paul Jackson)

1159050

PERFORMANCE:

Max level speed: A	61 kt (113 km/h; 70 mph)
B, C	65 kt (121 km/h; 75 mph)
Cruising speed	56 kt (105 km/h; 65 mph)
Hovering ceiling: IGE: all	2,440 m (8,000 ft)
OGE: A	1,830 m (6,000 ft)
B, C	1,980 m (6,500 ft)



Murphy Renegade Spirit (James Goulding)

1047838

DESIGN FEATURES: Heavier variant of Renegade II, distinguished by round, helmeted cowling chosen by most builders. Alternative, more powerful, power plants; internal and external refinements.

COSTS: Fast-build kit USD16,754; materials kit USD11,733; partial parts kit USD4,457; plans USD376 (2006).

POWER PLANT: One 47.8 kW (64.1 hp) Rotax 582 in-line engine standard, in radial-type cowling; 59.7 kW (80 hp) Rotax 912 flat-four or Alvis rotary engine optional.

DIMENSIONS, EXTERNAL: As for Renegade II

AREAS: As for Renegade II

WEIGHTS AND LOADINGS:

Weight empty	190–227 kg (420–500 lb)
Max T-O weight	431 kg (950 lb)

PERFORMANCE (two crew and Rotax 582 engine):

As for Renegade II except:

Max level speed	78 kt (145 km/h; 90 mph)
Cruising speed at 75% power	63 kt (116 km/h; 72 mph)
Stalling speed	35 kt (64 km/h; 40 mph)
Max rate of climb at S/L	152 m (500 ft)/min
T-O and landing run	107 m (350 ft)
Range at 75% power	206 n miles (381 km; 237 miles)

MURPHY REBEL

TYPE: Three-seat kitbuilt.

PROGRAMME: Construction of prototype started October 1989; first flight 1990; building of production aircraft/kits began in October 1990. Rebel Elite introduced in 1996.

CURRENT VERSIONS: **Rebel:** Standard version, as described.

Rebel Elite: Modified tricycle landing gear version, with metal-covered split flaps and fin of increased chord; O-320 or optional 134 kW (180 hp) Lycoming O-360 engine; and increased maximum T-O weight to 816 kg (1,800 lb). First flight (C-FWSF) 29 February 1996.

Super Rebel and Maverick: Described separately.

CUSTOMERS: Some 806 complete aircraft or kits (including 82 Elites) ordered by 1 September 2005; over 513 then flying.

COSTS: Rebel kit without engine USD16,647; Elite kit without engine USD23,413 tailwheel, USD24,595 tricycle (2006). Available in three sub-component kits.

DESIGN FEATURES: High-wing, cabin monoplane for recreational, training, cross-country, border patrol and other roles; designed to conform to FAR Pt 23 and JAR (Utility category); STOL performance. Optional fin fillet required for floatplane version. Wings braced by single streamline strut each side (no intermediate struts); wings detachable and horizontal tail folds upward for transportation and storage. Quoted build time 800 to 1,000 hours.

NACA 4415 (modified) wing section.

FLYING CONTROLS: Conventional and manual. Flaps. Elite has split flaps which droop up to 18° in 6° increments; metal-covered ailerons and cantilevered horizontal stabiliser.

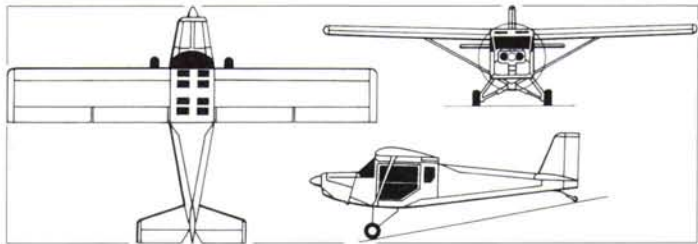
STRUCTURE: Aluminium alloy, semi-monocoque fuselage; flaperons fabric covered; three-spar wings covered in aluminium sheet glass fibre wingtips. Tailplane also strut-braced and is symmetrical. Rebel Elite wing leading-edge 60 per cent thicker than Rebel.

LANDING GEAR: Tailwheel type; fixed. Optional tricycle gear (Rebel Elite), skis, or Murphy 1500 or 1800 straight or wheeled or Montana 2100 wheeled floats, 6.00-6 wheels with 18 in high-profile tyres are standard. Standard mainwheel configuration of two faired-in side Vs hinged to lower longerons, plus half-axes, each with bungee cord shock-absorber, attached to compression frame; optionally, fuselage-mounted aluminium cantilever mainwheel legs with optional wheel fairings.



Murphy Rebel flown in Australia (Paul Jackson)

1159051



Murphy Rebel (Paul Jackson)

POWER PLANT: One 59.6 kW (79.9 hp) Rotax 912 UL, or 86.5 kW (116 hp) Textron Lycoming O-235-N2C engine; 2.27:1 reduction gear with Rotax engine and direct drive with O-235. Elite has 119 kW (160 hp) Lycoming O-320; or optional 134 kW (180 hp) Lycoming O-360; ground-adjustable wooden two-blade propeller; three-blade propeller optional. At AirVenture '06, July 2006, the 82 kW (110 hp) Rotec 2800 seven-cylinder radial engine was added to the Rebel options. Standard fuel capacity 167 litres (44.0 US gallons; 36.6 Imp gallons) in wing tanks; optional extra 220 litre (58.0 US gallon; 48.3 Imp gallon) tank.

ACCOMMODATION: Pilot and two passengers. Door on each side of cabin, half- or fully glazed. Most aircraft feature rear quarterlights for third occupant.

DIMENSIONS, EXTERNAL:

Wing span: Rebel	9.14 m (30 ft 0 in)
Elite	9.25 m (30 ft 4 in)
Wing chord, constant	1.52 m (5 ft 0 in)
Wing aspect ratio	6.0
Length overall: Rebel	6.50 m (21 ft 4 in)
Elite	6.78 m (22 ft 3 in)
Fuselage max width	1.12 m (3 ft 8 in)
Height overall: Rebel, Elite (tailwheel)	2.03 m (6 ft 8 in)
Elite (tricycle)	2.39 m (7 ft 10 in)
Tailplane span	2.79 m (9 ft 2 in)
Wheel track: Rebel	2.18 m (7 ft 2 in)
Elite	2.32 m (7 ft 7½ in)
Wheelbase: Rebel, Elite (tailwheel)	4.93 m (16 ft 2 in)
Elite (tricycle)	1.70 m (5 ft 7 in)
Propeller diameter	1.78 m (5 ft 10 in)

AREAS:

Wings, gross: Rebel	13.94 m ² (150.0 sq ft)
Elite	14.12 m ² (152.0 sq ft)

WEIGHTS AND LOADINGS (A: Rotax 912, B: O-235, E: Elite, O-360):

Weight empty: A	295–317 kg (650–700 lb)
B	374–408 kg (825–900 lb)
E	445 kg (980 lb)
Baggage capacity	45.5–68 kg (100–150 lb)
Max T-O weight: A	657 kg (1,450 lb)
B	748 kg (1,650 lb)
E	816 kg (1,800 lb)
Max wing loading: A	47.2 kg/m ² (9.67 lb/sq ft)
B	53.7 kg/m ² (11.00 lb/sq ft)
E	57.8 kg/m ² (11.84 lb/sq ft)
Max power loading: A	11.03 kg/kW (18.13 lb/hp)
B	8.66 kg/kW (14.22 lb/hp)
E	6.09 kg/kW (10.00 lb/hp)

PERFORMANCE (A, B, E as above):

Never-exceed speed (VNE):	
A	124 kt (230 km/h; 143 mph)
B	131 kt (243 km/h; 151 mph)
E	136 kt (252 km/h; 157 mph)
Max level speed: A	87 kt (162 km/h; 100 mph)
B	108 kt (201 km/h; 125 mph)
E	126 kt (233 km/h; 145 mph)
Cruising speed at 75% power:	
A	78 kt (145 km/h; 90 mph)
B	100 kt (185 km/h; 115 mph)
E	115 kt (212 km/h; 132 mph)
Stalling speed, power off, flaps up:	
A	35 kt (65 km/h; 40 mph)
B	39 kt (71 km/h; 44 mph)
E	40 kt (74 km/h; 46 mph)
Stalling speed, power off, flaps down:	
A	32 kt (58 km/h; 36 mph)
B	35 kt (65 km/h; 40 mph)
E	37 kt (68 km/h; 42 mph)
Max rate of climb at S/L: A	164 m (500 ft)/min
B	244 m (800 ft)/min
E	457 m (1,500 ft)/min
Service ceiling: B	3,960 m (13,000 ft)
T-O run: A	137 m (450 ft)
B	122 m (400 ft)
E	143 m (470 ft)
T-O to 15 m (50 ft): A, B	244 m (800 ft)
Landing run: A	92 m (300 ft)
B, E	122 m (400 ft)
Range with max fuel:	
A	764 n miles (1,416 km; 880 miles)
B	691 n miles (1,281 km; 796 miles)
E	593 n miles (1,099 km; 683 miles)
Endurance: B	7 h 36 min
E	5 h 12 min
g limits	+3.8/-2.5 (+5.7/-3.8 ultimate)

MURPHY SUPER REBEL and MOOSE

TYPE: Six-seat kitbuilt.

PROGRAMME: Announced April 1995; prototype Super Rebel (then designated SR 2500) (C-GKSR), with initial MTOW of 1,134 kg (2,500 lb), first flew November 1995; parts shipments began in late 1995 with tail sections. Tricycle version first flew May 1997.



Murphy Moose floatplane (Paul Jackson)

1159052



Aerotek T-Moose turboprop conversion (Paul Jackson)

1159053



Murphy Super Rebel six-seat kitbuilt (Paul Jackson)

1159054

Increased gross weight Moose (originally SR 3500) introduced at Sun 'n' Fun 2001; prototype converted from Super Rebel demonstrator C-GBZD.

CURRENT VERSIONS: **Super Rebel:** Standard version.

Moose: Increased gross weight version, first flown 2 April 2001 (VOKBM engine); choice of two power plants. Tailwheel version only.

T-Moose: Turbine conversion by Aerotek Aviation (www.aerotekaviation.ca) employing overhauled, ex-military Pratt & Whitney Canada T74-CP700 (PT6-20) derated to 336 kW (450 shp) from 410 kW (550 shp). Engine kit cost USD94,500, excluding MT-Propeller or Hartzell constant-speed propeller. Also requires airframe reinforcement, increase in wing fuel capacity to 606 litres (160 US gallons; 133 Imp gallons) and installation of 19 litre (5.0 US gallon; 4.2 Imp gallon) header tank.

Prototype C-FDBN, on Wipline 4000 amphibious floats, first flew 5 July 2005 and exhibited at AirVenture, Oshkosh, later that month. Weight empty 925 kg (2,040 lb); cruising speed 135 kt (249 km/h; 155 mph).

CUSTOMERS: Some 299 of both versions sold by September 2005.

COSTS: *Super Rebel:* Basic kit less engine, propeller, instruments and avionics; tailwheel version USD26,500; tricycle version USD28,000 (2006).

Moose: Basic kit, less engine, propeller, instruments and avionics, USD36,516 (2006). Fast-build kit extra USD18,258.

T-Moose: Firewall forward package USD94,500 (2006).

DESIGN FEATURES: Development of Murphy Rebel (which see). All-metal construction. Quoted build time 1,400 to 1,800 hours. Fast-build kits had quoted build time of 800–1,000 hours; however, in 2004 company announced that improvements in some 70 components had reduced times by over 200 hours.

FLYING CONTROLS: Conventional and manual. Horn-balanced tail surfaces. Electric trim and three-stage (0, 18, 33°) flaps; ailerons deflect 20° up and 12° down; ailerons droop 12° when 33° flap deployed.

STRUCTURE: Wing is identical in shape to that of Rebel and Elite; aerofoil modified NACA 4415. Three-spar wing; leading-edge of 0.032 sheet aluminium.

LANDING GEAR: Tailwheel configuration is standard; tricycle also available. Optional hardpoints enable rapid conversion. Main and nose tyres 8.00-6 in; tailwheel has 9 in tyre. Dual brakes. Optional 3600 series floats.

POWER PLANT: *Super Rebel:* Prototype has 186 kW (250 hp) Textron Lycoming O-540-A4A5 driving two-blade (three-blade optional) constant-speed Hartzell propeller, but design accommodates engines from 134 to 224 kW (180 to 300 hp). Fuel in two wing tanks, total capacity 227 litres (60.0 US gallons; 50.0 Imp gallons). Optional larger tanks increase capacity by further 303 litres (80.0 US gallons; 66.6 Imp gallons).

Moose: Choice of 186 kW (250 hp) Textron Lycoming IO-540 or 265 kW (355 hp) VOKBM M-14P radial, latter driving two-blade wooden propeller. Fuel capacity as Super Rebel.

ACCOMMODATION: Pilot and up to five passengers in two pairs of side-by-side seats plus optional jump seat; dual controls. Rear bench seat can be removed to provide cargo capacity. Baggage compartment is reached by large cargo door on port side of fuselage, behind passenger door.

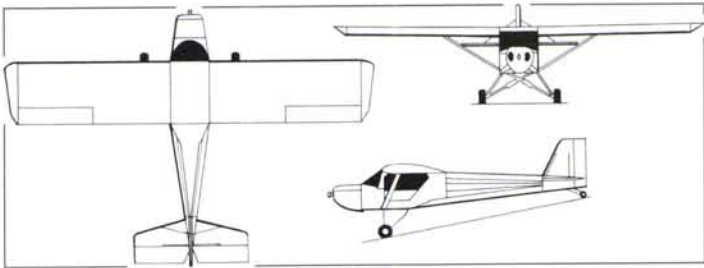
DIMENSIONS, EXTERNAL:

Wing span	10.97 m (36 ft 0 in)
Wing chord, constant	1.52 m (5 ft 0 in)
Wing aspect ratio	7.1
Length overall	7.01 m (23 ft 0 in)
Fuselage max width	1.12 m (3 ft 8 in)

Height overall: tailwheel	1.98 m (6 ft 6 in)
tricycle	2.67 m (8 ft 9 in)
Tailplane span	3.30 m (10 ft 10 in)
Wheel track	2.29 m (7 ft 6 in)
Wheelbase: tailwheel	5.94 m (19 ft 6 in)
tricycle	2.03 m (6 ft 8 in)
Propeller diameter: Super Rebel	2.13 m (7 ft 0 in)
Moose with M-14P engine	2.39 m (7 ft 10 in)
Passenger door: Height	1.07 m (3 ft 6 in)
Width	1.07 m (3 ft 6 in)
Baggage door: Height	0.83 m (2 ft 8½ in)
Width	0.93 m (3 ft 0½ in)
DIMENSIONS, INTERNAL:	
Cabin: Length	3.05 m (10 ft 0 in)
Max width	1.12 m (3 ft 8 in)
Height	1.30 m (4 ft 3 in)
AREAS:	
Wings, gross	16.91 m² (182.0 sq ft)
Ailerons (total)	2.37 m² (25.50 sq ft)
Flaps (total)	2.09 m² (22.50 sq ft)
WEIGHTS AND LOADINGS (Super Rebel with 186 kW; 250 hp engine, Moose with 265 kW; 355 hp engine):	
Weight empty: Super Rebel	748 kg (1,650 lb)
Moose	816 kg (1,800 lb)
Baggage capacity	113 kg (250 lb)
Max T-O weight: Super Rebel	1,361 kg (3,000 lb)
Moose	1,587 kg (3,500 lb)
Max wing loading:	
Super Rebel	80.5 kg/m² (16.48 lb/sq ft)
Moose	93.9 kg/m² (19.23 lb/sq ft)
Max power loading:	
Super Rebel	7.30 kg/kW (12.00 lb/hp)
Moose	6.00 kg/kW (9.86 lb/hp)
PERFORMANCE (engines as before):	
Never-exceed speed (VNE):	
Super Rebel	153 kt (284 km/h; 177 mph)
Moose	164 kt (304 km/h; 189 mph)
Max level speed:	
Super Rebel	139 kt (257 km/h; 160 mph)
Moose	152 kt (282 km/h; 175 mph)
Max cruising speed at 70% power:	
Super Rebel	126 kt (233 km/h; 145 mph)
Moose	135 kt (249 km/h; 155 mph)
Stalling speed, power off:	
flaps up: Super Rebel	46 kt (84 km/h; 52 mph)
Moose	49 kt (91 km/h; 56 mph)
flaps down: Super Rebel	40 kt (74 km/h; 46 mph)
Moose	44 kt (81 km/h; 50 mph)
Max rate of climb at S/L:	
Super Rebel	305 m (1,000 ft)/min
Moose	457 m (1,500 ft)/min
Service ceiling	4,575 m (15,000 ft)
T-O run: Super Rebel	183 m (600 ft)
Landing run: Super Rebel	152 m (500 ft)
Moose	183 m (600 ft)
Range:	
with max standard fuel:	
Super Rebel	537 n miles (996 km; 619 miles)
Moose	521 n miles (965 km; 600 miles)
with optional larger tanks:	
Super Rebel	729 n miles (1,350 km; 839 miles)
Endurance: Super Rebel	4 h 15 min
Moose	4 h 0 min
g limits (ultimate): both	+5.7/-3.8

MURPHY MAVERICK

TYPE: Side-by-side ultralight kitbuilt.
PROGRAMME: Original design shelved in favour of Rebel, but revived in 1994 to meet Japanese ultralight restrictions; prototype/demonstrator G-MYSS used to gain UK BCAR Section S type approval in 1995.
CUSTOMERS: Total of 107 completed and flown by late 2005, at which time 135 kits had been sold.
COSTS: Kit: USD15,036 without engine (2006).



Murphy Maverick two-seat ultralight (Paul Jackson) 0064887

DESIGN FEATURES: Derivative of Rebel, with 40 per cent commonality of parts, including optional wingtip extensions.
FLYING CONTROLS: As Rebel, except cable-operated ailerons only instead of full-span flaperons.
STRUCTURE: Similar to Rebel, but with weight-saving features. Wings omit full-span stringers and are fabric covered; glass fibre engine cowlings; tail surfaces also fabric covered.
LANDING GEAR: As Rebel.
POWER PLANT: One two-cylinder two-stroke engine (39.5 kW; 53 hp Rotax 503 DC or 47.8 kW; 64.1 hp Rotax 582 UL); GSC 68GA two-blade propeller. Testing with Hpower HKS-700E four-stroke engine completed in November 1999. Fuel capacity 18.9 litres (5.0 US gallons; 4.2 Imp gallons) standard, 53 litres (14.0 US gallons; 11.7 Imp gallons) in optional wing tanks.
DIMENSIONS, EXTERNAL:

Wing span: standard	8.97 m (29 ft 5 in)
with extended tips	9.88 m (32 ft 5 in)
Length overall, tail up	6.30 m (20 ft 8 in)

AREAS:

Wings, gross: standard	13.66 m² (147.0 sq ft)
with extended tips	15.05 m² (162.0 sq ft)

WEIGHTS AND LOADINGS (standard span and Rotax 503 DC engine):

Weight empty	179-191 kg (395-420 lb)
Max T-O weight	431 kg (950 lb)

PERFORMANCE (standard span and Rotax 503 DC engine):

Max level speed	82 kt (153 km/h; 95 mph)
Cruising speed at 75% power	70 kt (129 km/h; 80 mph)
Stalling speed	28 kt (52 km/h; 32 mph)
Max rate of climb at S/L	183 m (600 ft)/min
T-O run	46 m (150 ft)
Landing run	61 m (200 ft)
Range with max fuel at 75% power	243 n miles (450 km; 280 miles)
g limits	+5.7/-3.8

MURPHY JDM-8

TYPE: Single-seat ultralight kitbuilt.
PROGRAMME: Design commenced December 1998; initially shown in uncompleted form at Oshkosh in 2000. Prototype (C-IGTD) first flown 30 March 2001 and made public debut at Sun 'n' Fun the following month as 'conceptual' design to evaluate market response. Launched at AirVenture, Oshkosh, July 2001.
Following a customer survey undertaken in March 2003, the US legal ultralight production was superseded by the development of a homebuilt/advanced ultralight version. A decision to launch production had not been made by January 2006.
CUSTOMERS: Two prototypes registered by September 2003; one FAR Pt 103 compliant ultralight (C-IGTD) and one homebuilt/advanced ultralight example (C-IBFZ).
COSTS: Projected cost USD8,495 excluding engine and chemical agents.
DESIGN FEATURES: Murphy's first low-wing design. Wings fold upwards for storage. Enclosed cockpit optional.
FLYING CONTROLS: Conventional and manual. No aerodynamic balancing. Frise ailerons.
STRUCTURE: Semi-monocoque fuselage and constant-chord wings covered with aluminium sheet; wings comprise three C-channel spars and have NACA 4415 section. Ailerons have aluminium ribs; aluminium tube empennage with wire bracing; control surfaces fabric-covered.
LANDING GEAR: Tailwheel type; fixed. Standard two side Vs hinged to wingroots, plus half-axes, each with bungee cord shock-absorber; optional 4130 spring steel circular tube cantilever legs. 12.7 cm (5 in) mainwheels with 8.00-6 tyres and 8.8 cm (3½ in) tailwheel. Sealed ball bearings. Hydraulic brakes.
POWER PLANT: Design accepts most two- and four-stroke engines in the 37.3 to 59.7 kW (50 hp to 80 hp) range. Fuel capacity 75.7 litres (20.0 gallons; 16.7 Imp gallons). Optional 34 litre (9.0 US gallon; 7.5 Imp gallon) wing tanks.



Murphy Maverick built by a UK owner (Paul Jackson) 0589435



Murphy JDM-8 second prototype (Paul Jackson)

1042679

DIMENSIONS, EXTERNAL:	
Wing span	6.10 m (20 ft 0 in)
Width, wings folded	2.44 m (8 ft 0 in)
Length overall	4.47 m (14 ft 8 in)
Height overall	1.63 m (5 ft 4 in)
DIMENSIONS, INTERNAL:	
Cabin max width	0.66 m (2 ft 2 in)
AREAS:	
Wings, gross	9.29 m ² (100.0 sq ft)
WEIGHTS AND LOADINGS (44.7 kW; 60 hp HKS-700E):	
Weight empty	136–204 kg (300–450 lb)
Max T-O weight	353 kg (780 lb)
PERFORMANCE:	
Never-exceed speed (VNE)	100 kt (185 km/h; 115 mph)
Normal cruising speed	78 kt (145 km/h; 90 mph)
Stalling speed	31 kt (57 km/h; 35 mph)
Max rate of climb at S/L	305 m (1,000 ft)/min
T-O run	53 m (175 ft)
Landing run	91 m (300 ft)
Endurance	5 h
g limits	±3.8

MURPHY YUKON

TYPE: Four-seat kitbuilt.

PROGRAMME: Announced early 2006, when prototype under construction.

COSTS: Kit tailwheel USD34,995, nosewheel USD36,600 (2006).

DESIGN FEATURES: High-wing cabin monoplane, development of Rebel family, fitting in size between Rebel and Super Rebel. Wings braced by single strut each side.

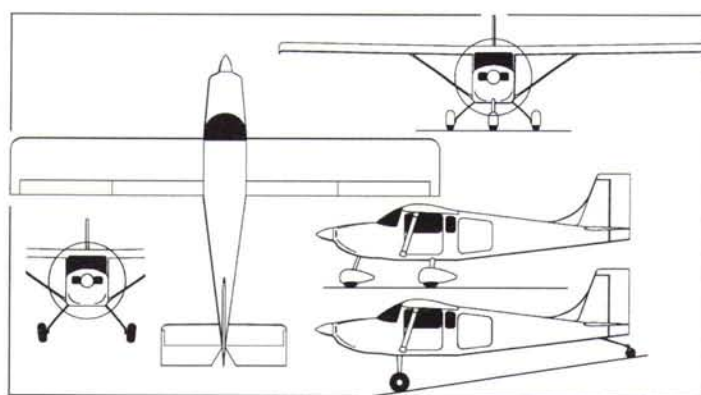
FLYING CONTROLS: Conventional and manual. Horn-balanced tail surfaces. Electric trim and flaps.

STRUCTURE: Aluminium alloy, semi-monocoque fuselage. Glass fibre tailplane fairing. Downturned wingtips.

LANDING GEAR: Fixed; choice of tailwheel or tricycle. Fuselage-mounted, spring aluminium cantilever mainwheel legs. Mainwheel tyres 8.0-6 in. Dual caliper disc brakes.

POWER PLANT: One 134 kW (180 hp) Textron Lycoming O-360. Standard fuel capacity 227 litres (60.0 US gallons; 50.0 Imp gallons) in two wing tanks; optional tanks increase capacity to 303 litres (80.0 US gallons; 66.6 Imp gallons).

ACCOMMODATION: Pilot and three passengers; individual front seats and rear bench seat. Cargo door on port side of fuselage behind cabin. Optional bubble windows.



Murphy Yukon tricycle variant, with additional side view and scrap nose view of tailwheel option (Paul Jackson)

1128974

DIMENSIONS, EXTERNAL:	
Cargo door: Height	0.91 m (3 ft 0 in)
AREAS:	
Wings, gross	17.65 m ² (190.0 sq ft)
WEIGHTS AND LOADINGS:	
Weight empty	635 to 658 kg (1,400 to 1,450 lb)
Max T-O weight	1,156 kg (2,550 lb)
Max wing loading	65.5 kg/m ² (13.42 lb/sq ft)
Max power loading	8.62 kg/kW (14.17 lb/hp)
PERFORMANCE:	
Never exceed speed (VNE)	153 kt (284 km/h; 177 mph)
Max operating speed	122 kt (225 km/h; 140 mph)
Cruising speed at 75% power	113 kt (209 km/h; 130 mph)
T-O run	122 m (400 ft)
Landing run	153 m (500 ft)
Range, standard fuel	760 n miles (1,408 km; 875 miles)
Endurance	7 h 0 min
g limits	+5.9/-3.8

NORDIC

NORMAN AVIATION INTERNATIONAL INC

Aéroport Jacques Normand, 1175 Rang St-Philippe Sud, St-Anselme, Québec G0R 2N0
 Tel: (+33 3) 25 37 50 28
 e-mail: norman.aviation@sympatico.ca
 Web: www3.sympatico.ca/norman.aviation
 PRESIDENT: Jacques Normand

EUROPEAN MARKETING:

Euro Fly Aero
 Hubert Ferté, Aérodrome de Montardoise, F-10150 Montsuzain, France
 Tel: (+33 3) 25 37 50 28
 Fax: (+33 3) 25 37 50 27
 e-mail: ferté.euro@wanadoo.fr

Previous products of Nordic have been the I, II, III, IV, V, VI and VII, of which II and VI versions remain available. Most recent addition is the Nordic 8 (sic).

NORDIC 8 MINI EXPLORER

TYPE: Side-by-side ultralight kitbuilt.

PROGRAMME: Mini Explorer is third, and smallest, of a series of similar concept aircraft, begun with the twin-engined Explorer, produced by Hubert DeChevigny and Dean Wilson (the latter, designer of the Avid Flyer and other light aircraft). The single-engined Private Explorer (14.40 m; 47 ft 3 in span, 1,860 kg; 4,102 lb MTOW) flew in 1998 and was

marketed as a kit from Idaho, USA. The sixth of the type was registered in Canada during September 2003.

First Mini Explorer (C-IGXF) was registered in November 2001; marketing began 2002.

European marketing proceeding in parallel; first French-built aircraft was noted in 2003. CUSTOMERS: At least four built in Canada and one in France by April 2006.

COSTS: Kit CAD34,500 less engine (2006).

DESIGN FEATURES: Rugged construction, with deep and wide fuselage to provide sleeping accommodation.

High, constant-chord wing with V bracing struts each side. Quoted build time 500 hours. FLYING CONTROLS: Conventional and manual.

STRUCTURE: 4130 steel fuselage frame with fabric covering; wooden wings with geodesic ribs. **LANDING GEAR:** Tricycle type; fixed. Fuselage-mounted cantilever mainwheel legs; levered nosewheel with helical spring shock-absorber.

POWER PLANT: One flat-four piston engine: 73.5 kW (98.6 hp) Rotax 912 ULS or 84.5 kW (113.3 hp) Rotax 914 UL. Fuel capacity 106 litres (28.0 US gallons; 23.3 Imp gallons).

ACCOMMODATION: Two persons, side by side. Floor to rear with space for (typically) utensil storage cupboard and hand-basin, plus bed.

DIMENSIONS, EXTERNAL:	
Wing span	10.97 m (36 ft 0 in)
Wing chord (constant)	1.52 m (5 ft 0 in)
Wing aspect ratio	7.2
Length overall	6.40 m (21 ft 0 in)
Height overall	1.47 m (4 ft 10 in)
DIMENSIONS, INTERNAL:	
Cabin: Max width	1.22 m (4 ft 0 in)
Floor area	3.72 m ² (40.0 sq ft)



Nordio/Euro Fly Aero Mini Explorer registered in the French ultralight series (Geoffrey P Jones)

0572154

AREAS:			
Wings, gross	16.72 m ² (180.0 sq ft)	Stalling speed	33 kt (62 km/h; 38 mph)
WEIGHTS AND LOADINGS:		Max rate of climb at S/L (solo)	259 m (850 ft)/min
Weight empty	297 kg (654 lb)	Service ceiling	3,050 m (10,000 ft)
Max T-O weight	558 kg (1,232 lb)	T-O run	92 m (300 ft)
PERFORMANCE:		Landing run	61 m (200 ft)
Never-exceed speed (VNE)	113 kt (209 km/h; 130 mph)	Range	680 n miles (1,259 km; 782 miles)
Cruising speed at FL50	74 kt (137 km/h; 85 mph)	Endurance	7 h

RAF

ROTARY AIR FORCE MARKETING INC

PO Box 1236, 1107-9th Street W, Kindersley, Saskatchewan S0L 1S0
Tel: (+1 306) 463 60 30
Fax: (+1 306) 463 60 32
e-mail: info@raf2000.com
Web: www.raf2000.com
PRESIDENT: Don LaFleur

Incorporated in 1987, Rotary Air Force employs 14 people.
In May 2001, RAF announced that it would be expanding its activities into commercial applications, including agricultural spraying and paramilitary functions.
Since 2005, all RAF autogyros have been fitted with a stabilator as a safety aid.

RAF 2000

TYPE: Two-seat autogyro kitbuilt.
PROGRAMME: Introduced 1990, superseding earlier RAF 1000, conforms to 51 per cent homebuilt rules.
CURRENT VERSIONS: **2000 STD-SE**: Original version; no longer available.
2000 GTX-SE: Basic model; kit includes carbureted version of engine, rotor brake, heater, dual controls and adjustable pitch and roll trim assembly.
Data refer to this version unless otherwise stated.
2000 GTX-SE FI: Fuel-injected version of GTX; choice of Subaru EJ22 or EJ25 engine.
CUSTOMERS: RAF autogyros sold in 46 countries. At least 630 believed completed and flown by end 2005, including 257 in North America.
COSTS: 2000 GTX-SE kit price USD24,900, including Subaru EJ22 engine (carb version); 2000 GTX-SE FI USD27,900, including injected Subaru EJ22; 2000 GTX-SE FI USD31,500, including fuel-injected Subaru EJ25 (all 2006).
DESIGN FEATURES: Pusher autogyro. Suitable for training, crop-spraying, power line inspection, predator control, stock mustering and aerial photography. Quoted build time 150–250 hours.
From 2005, fitted as standard with rotor stabilator, designed by Duane Hunn Sr, comprising horizontal stabiliser attached to rear of torque tube via linear actuator and mounted at mid-point of rotor mast. Responding to up- or down-draughts, stabilator

automatically corrects rotor angle to provide high precision trim control. Input variable by control in cockpit; also functions as roll trim.
STRUCTURE: Composites RAF rotor blade features 6061-T6 aluminium spar and foam filler with 5 cm (2 in) Kevlar strip on leading edge. Patented 5 × 10 cm (2 × 4 in) folding (two-part) rotor mast, rubber mast bushing and adjustable CG. Removable doors.
LANDING GEAR: Tricycle type; fixed; optional tailwheel speed fairings.
POWER PLANT: One 97 kW (130 hp) Subaru EJ22 16-valve four-cylinder liquid-cooled engine driving a ground-adjustable three-blade Warp Drive composites propeller through RAF cog



Current configuration of RAF 2000 autogyro (Paul Jackson)

1159055



Hinged stabilator now standard on RAF 2000s to provide automatic gust response (Paul Jackson)

1129225

belt reduction gear, ratio 2.10:1. Fuel capacity 95 litres (25.0 US gallons; 20.8 Imp gallons), of which 87 litres (23.0 US gallons; 19.2 Imp gallons) usable; tanks moulded into seats. Fuel consumption carbureted version 20.1 litres (5.3 US gallons; 4.4 Imp gallons)/h, injected version 18.2 litres (4.8 US gallons; 4.0 Imp gallons)/h, both at 80 per cent power. ACCOMMODATION: Pilot and passenger side by side in enclosed cabin. Can be flown with doors removed.

SYSTEMS: 35 A alternator, electric starter.

EQUIPMENT: Agricultural version has 114 litre (30.0 US gallon; 25.0 Imp gallon) tank, moulded to fit into back and bottom of cabin enclosure, supplying a 24-nozzle spraybar fitted behind and below the engine. Spray width 6.7 to 7.3 m (22 to 24 ft).

DIMENSIONS, EXTERNAL:

Rotor diameter	9.14 m (30 ft 0 in)
Rotor blade chord	0.22 m (8½ in)
Fuselage: Length	4.11 m (13 ft 6 in)
Max width	1.08 m (3 ft 6½ in)
Width over wheels	1.59 m (5 ft 2½ in)
Height overall: GTX-SE	2.58 m (8 ft 5½ in)
Propeller diameter	1.73 m (5 ft 8 in)
Wheel track	1.55 m (5 ft 1 in)
Wheelbase	3.91 m (12 ft 10 in)

DIMENSIONS, INTERNAL:

Cabin: Length	1.50 m (4 ft 11 in)
Max Width	1.09 m (3 ft 7 in)
Max Height	1.32 m (4 ft 4 in)

SMITH

SMITH AVIATION

16998 Gregory Drive, RR #3, Thorndale, Ontario N0M 2P0

Tel: (+1 519) 461 02 74

Fax: (+1 519) 461 00 34

e-mail: replicap18@execulink.com

Web: www.supercubkits.ca

DIRECTORS: Nick Smith Sr

Nick Smith Jr

This company is one of several specialising in manufacture of kits for the Piper PA-18 Super Cub and PA-18-95 Cub Special. It also offers similar services for the Piper PA-11 Cub Special, PA-12/14 Super Cruiser and Bushmaster/Super Pacer version of PA-20, now known as Tundra Boss.

SMITH PIPER PA-18 SUPER CUB

TYPE: Two-seat lightplane.

PROGRAMME: Description of Piper PA-18 appears in Cub Crafters entry in US section of *Jane's All the World's Aircraft*. Smith version generally similar, although with customer options and some detail improvements and modifications.

COSTS: Kit USD31,500, excluding engine and avionics (2006).

SMITH TUNDRA BOSS

TYPE: Four-seat kitbuilt.

PROGRAMME: Assembly of prototype began January 2005.

CUSTOMERS: Three ordered by late 2005.

COSTS: Kit USD37,500.



Smith Piper Super Cub fitted with an Innodyn turboprop with which it first flew on 20 July 2005 (Paul Jackson)

112922

AREAS:

Rotor disc 65.67 m² (706.9 sq ft)

WEIGHTS AND LOADINGS:

Weight empty: GTX-SE 363 kg (800 lb)
Max T-O weight 698 kg (1,540 lb)
Max disc loading 10.6 kg/m² (2.18 lb/sq ft)
Max power loading 7.21 kg/kW (11.85 lb/hp)

PERFORMANCE, POWERED (two occupants):

Max operating speed (VMO) 87 kt (161 km/h; 100 mph)
Cruising speed: GTX-SE 65 kt (121 km/h; 75 mph)
Unstick speed 26–35 kt (48–64 km/h; 30–40 mph)
Min flying speed 17–26 kt (32–48 km/h; 20–30 mph)
Max rate of climb at S/L 305 m (1,000 ft)/min
Service ceiling 3,050 m (10,000 ft)
T-O run 23–107 m (75–350 ft)
Landing run Up to 3 m (10 ft)
Range with max fuel:
GTX-SE 261 n miles (483 km; 300 miles)
GTX-SE FI 313 n miles (579 km; 360 miles)

Endurance with 30 min reserves:

standard fuel: GTX-SE 3 h 30 min
optional fuel: GTX-SE FI 4 h 18 min

PERFORMANCE, UNPOWERED:

Glide ratio 4:1

DESIGN FEATURES: Based on fuselage of Piper Pacer, but 10 cm (4 in) wider (1.07 m; 3 ft 6 in) at the cockpit and with wing pickups raised 8.5 cm (3½ in) to give additional headroom for occupants and allow use of Piper Super Cub V-struts for extended Cub wings with longer flaps (2.03 m; 6 ft 8 in) and ailerons (2.90 m; 9 ft 6 in) and 6061-T6 metal main spar. Landing gear and empennage from Super Cub. Stronger structure for increased MTOW includes lower longerons of increased gauge.

FLYING CONTROLS: Conventional and manual.

STRUCTURE: Welded steel tube fuselage with metal floor; wing of stamped aluminium ribs mounted on metal spar with sheet aluminium leading-edge; both with fabric covering.

LANDING GEAR: Tailwheel type; fixed. Two faired-in side Vs hinged to lower longerons, each with bungee cord shock absorber attached to compression frame.

POWER PLANT: One piston engine. Textron Lycoming O-540 of 194 kW (260 hp) in prototype; 224 kW (300 hp) Teledyne Continental IO-550, 265 kW (355 hp) VOKBM M-14 radial and Innodyn turboprop also specified by individual customers.

Standard fuel capacity 182 litres (48.0 US gallons; 40.0 Imp gallons) in inboard wing tanks and two 38 litre (10.0 US gallon; 8.3 Imp gallon) fuselage tanks; optional outboard wing tanks with additional total of 136 litres (36.0 US gallons; 30.0 Imp gallons).

ACCOMMODATION: Four adults with option for two additional children in place of baggage.

DIMENSIONS, EXTERNAL:

Wing span 9.86 m (32 ft 4 in)

DIMENSIONS, INTERNAL:

Cabin: Max width 1.07 m (3 ft 6 in)
Length behind front seats 2.44 m (8 ft 0 in)

WEIGHTS AND LOADINGS:

Weight empty average 635 kg (1,400 lb)
Max T-O weight 1,315 kg (2,900 lb)

PERFORMANCE:

Never-exceed speed (VNE) 152 kt (281 km/h; 175 mph)
Max level speed 130 kt (241 km/h; 150 mph)
Cruising speed at 75% power 113 kt (209 km/h; 130 mph)
T-O run 183 m (600 ft)

ST JUST

ST JUST AVIATION INC

Suite 204, 1310 Gay-Lussac, Boucherville, Québec J4B 7G4

Tel: (+1 450) 641 86 86

Fax: (+1 450) 641 84 21

e-mail: st-justaviation@sympatico.ca

Web: www3.sympatico.ca/st-justaviation

PRESIDENT: Guy Cantin

DIRECTOR: Albert Beaudry

Original Avionerie du Lac St John formed in 1991 to provide parts for Cessna 185 owners after that company removed the aircraft from its product line; later progressed to manufacturing kits of the Cyclone. Sold to St Just Aviation in 1997. Approximately 40 now flying.

ST JUST SUPER CYCLONE

TYPE: Four-seat kitbuilt.

PROGRAMME: Introduced in 1997; based on reverse engineering of the Cessna 180/185 (which see in *Jane's Aircraft Upgrades*).

CUSTOMERS: Total 71 sold and 39 flying by January 2006, including 23 in Canada and two in US.

COSTS: Basic kit USD59,950 (2006).

DESIGN FEATURES: Compared to Cessna 180/185, Super Cyclone has span increased by addition of 30 cm (1 ft) at each wingroot, which increases flap length, lowers stalling speed, enhances stability and increases maximum T-O weight. Quoted build time 2,000 hours.

FLYING CONTROLS: Conventional and manual. Flaps.

STRUCTURE: Single-strut braced, two-spar wing with constant-chord centre-section and tapered outer sections. Wing and empennage constructed of 2024 T-3 aluminium; composites engine cowlings. Large fin fillet. Low-mounted tailplane.



Seaplane version of St Just Super Cyclone

0137973

LANDING GEAR: Tailwheel type, with sprung steel main legs; Federal wheel/skis and floats can be fitted. Mainwheels 6.00-6.

POWER PLANT: One 224 kW (300 hp) Teledyne Continental IO-520, flat-six engine, driving a three-blade, constant-speed McCauley propeller. Optional alternative engines between 149 and 261 kW (200 and 350 hp). Fuel capacity 341 litres (90.0 US gallons; 75.0 Imp gallons), of which 318 litres (84.0 US gallons; 70.0 Imp gallons) are usable.

ACCOMMODATION: Pilot and three passengers in two pairs of seats with upward-hinged door on each side of cabin. Additional baggage door on port side of fuselage behind cabin. Compared to Cessna 185, has a third cabin window each side.

AVIONICS: Full IFR panel available.

DIMENSIONS, EXTERNAL:

Wing span	11.58 m (38 ft 0 in)
Wing aspect ratio	7.2
Length overall	7.92 m (26 ft 0 in)
Height overall	2.41 m (7 ft 11 in)
Propeller diameter	2.18 m (7 ft 2 in)

DIMENSIONS, INTERNAL:

Cabin max width	1.07 m (3 ft 6 in)
-----------------	--------------------

AREAS:

Wings, gross	17.74 m ² (191.0 sq ft)
--------------	------------------------------------

WEIGHTS AND LOADINGS:

Weight empty	839 kg (1,850 lb)
Baggage capacity	68 kg (150 lb)
Max payload	680 kg (1,500 lb)
Max T-O weight	1,587 kg (3,500 lb)
Max wing loading	89.5 kg/m ² (18.32 lb/sq ft)
Max power loading	7.10 kg/kW (11.67 lb/hp)

PERFORMANCE:

Max operating speed	152 kt (281 km/h; 175 mph)
Max cruising speed	142 kt (263 km/h; 163 mph)
Stalling speed: flaps up	37 kt (68 km/h; 42 mph)
flaps down	33 kt (62 km/h; 38 mph)
Max rate of climb at S/L	488 m (1,600 ft)/min
Service ceiling	4,570 m (15,000 ft)
T-O run	69 m (225 ft)
Landing run	122 m (400 ft)
Range with max fuel	788 n miles (1,460 km; 907 miles)
g limits	+3.8/-1.5

SYMPHONY

SYMPHONY AIRCRAFT INDUSTRIES

3005 rue Lindbergh, Trois-Rivières, Québec G9A 5E1

Tel: (+1 819) 377 39 79

Fax: (+1 819) 377 79 28

Web: www.symphonyaircraft.com

PRESIDENT AND CEO: Paul Costanzo

VICE-PRESIDENT, ENGINEERING: Mirko Zgela

VICE-PRESIDENT, SALES AND MARKETING: Tim Baldwin

Symphony Aircraft Industries was formed in June 2004 to take over manufacture and marketing of former OMF Symphony (Germany) two- and four-seat aircraft in a 2,500 m² (26,900 sq ft) manufacturing facility originally built for OMF's Canadian subsidiary, OMF Aircraft at Trois-Rivières, Québec, Canada. Transfer formally took place on 15 February 2005. Production was set at 50 aircraft for 2005 (later revised to 40; 12 achieved) and 70 for 2006, and by October 2004 Symphony had 16 staff; this reached 75 by January 2006 and was expected to reach 125 by the end of 2006.

In June 2006, company went into protected status, similar to US Chapter 11 reorganisation, fitting changes in the Canadian investment market, at which time it had delivered 15 SA 160s and had an order book for 20 more.

SYMPHONY SA 160

TYPE: Two-seat lightplane.

PROGRAMME: Redesign of Arlington Aircraft/Stoddard-Hamilton (now New GlaStar) GlaStar to JAR 23 certification standards began in May 1998 for production and marketing by OMF Flugzeugbau GmbH, Germany. First prototype (D-ETCW, c/n P1) was essentially unchanged and first flew May 1999; second prototype D-EMVP (c/n 0001), with modifications to meet JAR 23, first flown 7 October 1999; third aircraft (D-ENVG) had not flown by June 2000, when it made type's public debut at Berlin Air Show. LBA evaluation began mid-July 2000 and certification and production certificate both awarded 29 August 2000; FAA certificate A43CE awarded 9 April 2001; IFR certification issued June 2002.



Thirteenth Canadian-built Symphony SA 160, completed in 2006 colour scheme (Paul Jackson)

1159056

Customer deliveries began November 2001. Transport Canada certification awarded to Canadian subsidiary, OMF Aircraft, on 18 June 2003; production by OMF ceased late 2003.

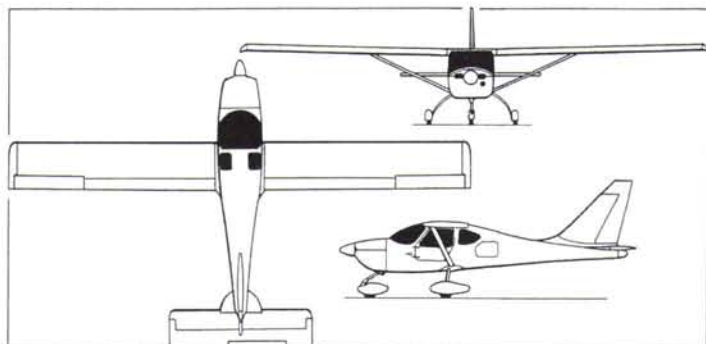
Transport Canada type certificate issued 18 March 2005 to Symphony Aircraft with new designation SA 160; first delivery of Canadian-built aircraft (C-GUSA; c/n S001); achieved 31 March 2005, FAA type certificate issued 2 May 2005.

CURRENT VERSIONS: OMF-100-160 **Symphony 160:** German production; now ended. Aircraft up to c/n 0012 limited to 889 kg (1,960 lb) MTOW; c/n 0013 to 0022 capable of upgrade to 975 kg (2,150 lb).

SA 160: Baseline two-seat version; as described.

Symphony 250: Four-seat version announced at Sun 'n' Fun, April 2003 (as Symphony 4); first flight then expected before end 2003, but delayed by bankruptcy. Data given are provisional. Has longer, tapered wing and longer cabin section with wider door. Decision on development made late 2005; in abeyance for foreseeable future.

Symphony 135TDI: First flown, as modification of D-EMVP, June 2003; powered by diesel engine. A decision on development was made late 2005; in abeyance for foreseeable future.



Symphony SA 160 two-seat lightplane (Paul Jackson)

1128975

CUSTOMERS: Total 42 (excluding non-conforming prototype, P1) of which one built by OMF Flugzeugwerke; all others by OMF Flugzeugbau by late 2003 when OMF manufacture ceased. OMF had a target production rate of 300 aircraft per year by 2008 before bankruptcy intervened. Total of 14 SA 160s registered by April 2006.

COSTS: Symphony 160 USD149,900 VFR equipped; USD207,900 IFR equipped (both 2006). **DESIGN FEATURES:** Intended to be an inexpensive trainer and lightplane. Completely redesigned landing gear and wing; retains only some 10 per cent commonality with GlaStar. Crashworthy cockpit and seats. Around 60 per cent of aircraft built by Symphony; remainder sourced primarily from US. Service life of 18,000 hours. Braced, unswept high wing of constant chord. Tailplane has curved, leading-edge root strakes; tall, sweptback fin. Centre-section of top wing thickened in late 2001, increasing maximum T-O weight.

FLYING CONTROLS: Conventional and manual. Mass-balanced Frise ailerons with three hinges each (compared to GlaStar's two), travel up 23°/down 17°; electrically operated, metal, three-position Fowler flaps (0, 20 and 40°), horn-balanced, single-piece elevator with anti-balance tab, travel up 21°/down 20°; horn-balanced rudder, travels 21° in each direction. Two T-shape vortex generators added to wings in front of each aileron. Ailerons have end-fences: protruding above the surface at inboard end and below, outboard.

STRUCTURE: Welded 4130 steel tube fuselage structure consisting of fuselage cage and aft fuselage; former extends from firewall to tricycle landing gear truss, just aft of seats. Wings attach to cage at each spar using one attachment bolt at each spar. Wing struts attach to cage aft of doors and just above landing gear. Engine mount attaches to cage at five points. Aft fuselage extends from end of fuselage cage to horizontal tail aft attachment fitting. A non-structural glass/epoxy cell runs from the cowl split line to the tailcone.

Wings of aluminium skin, spar and rib construction; aluminium alloys exclusively used in wings and associated control surfaces.

LANDING GEAR: Tricycle type; fixed. Fuselage-mounted spring steel cantilever mainwheel legs with wheel fairings. Castoring nosewheel with speed fairing. Cleveland hydraulic brakes. All wheels 5.00-5. Nosewheel turning circle 6.7 m (22 ft).

POWER PLANT: SA 160: One 119 kW (160 hp) Textron Lycoming O-320-D2A flat-four, driving a two-blade fixed-pitch MT-186R-140-3D P-244-3 propeller. Fuel in two main tanks, each 58.5 litres (15.45 US gallons; 12.9 Imp gallons), and one 6 litre (1.6 US gallon; 1.3 Imp gallon) feeder tank, total capacity 123 litres (32.5 US gallons; 27.1 Imp gallons) of which 110 litres (29.0 US gallons; 24.2 Imp gallons) usable. Oil capacity 7.6 litres (2.0 US gallons; 1.7 Imp gallons).

ACCOMMODATION: Two persons side by side on leather-covered glass fibre-reinforced composites material seats capable of withstanding 26 g forward and 19 g vertical crash; front-hinged door each side; rear baggage compartment behind crew with separate door on port side as alternative access. Can be flown with doors removed.

SYSTEMS: Electric system 24 V 70 A DC. Vision Microsystems VM1000 engine monitoring system and EC-100 caution and advisory system.

AVIONICS: Standard IFR Suite includes Garmin GNS430 and GNC420 GPS/Nav/com, GMA340 audio panel, GTX327 transponder and GI-106A CDI.

EQUIPMENT: BRS parachute system developed as option for SA 160; first aircraft so equipped delivered 10 April 2006.

DIMENSIONS, EXTERNAL:

Wing span	10.67 m (35 ft 0 in)
Wing chord	1.12 m (3 ft 8 in)
Wing aspect ratio	9.5
Length overall	6.96 m (22 ft 10 in)
Max width of fuselage	1.22 m (4 ft 0 in)
Height overall	2.82 m (9 ft 3 in)
Tailplane span	3.08 m (10 ft 1 1/4 in)
Wheelbase	1.73 m (5 ft 8 in)
Propeller diameter	1.85 m (6 ft 1 in)
Propeller ground clearance	0.18 m (7 in)
Passenger door: Height	0.80 m (2 ft 7 1/2 in)
Max width	0.81 m (2 ft 7 3/4 in)
Height to sill	0.84 m (2 ft 9 in)
Baggage door: Height	0.45 m (1 ft 5 3/4 in)
Max width	0.44 m (1 ft 5 1/4 in)
Height to sill	0.84 m (2 ft 9 in)

DIMENSIONS, INTERNAL:

Cabin: Length	1.22 m (4 ft 0 in)
Max width	1.10 m (3 ft 7 1/4 in)
Max height	1.14 m (3 ft 9 in)
Floor area	1.34 m ² (14.4 sq ft)
Volume	1.53 m ³ (54 cu ft)
Baggage compartment: volume	0.06 m ³ (2.1 cu ft)

AREAS:

Wings, gross	11.93 m ² (128.4 sq ft)
Ailerons (total)	1.26 m ² (13.56 sq ft)
Flaps (total)	1.56 m ² (16.79 sq ft)
Tailplane	1.52 m ² (16.36 sq ft)
Elevators (total, incl tabs)	1.29 m ² (13.89 sq ft)

WEIGHTS AND LOADINGS:

Weight empty	658 kg (1,450 lb)
Max baggage weight: front	45 kg (99 lb)
rear	45 kg (99 lb)
combined	75 kg (165 lb)
Max T-O weight	975 kg (2,150 lb)
Max wing loading	81.8 kg/m ² (16.74 lb/sq ft)
Max power loading	8.18 kg/kW (13.44 lb/hp)

PERFORMANCE:

Never-exceed speed (VNE)	162 kt (300 km/h; 186 mph)
Max level speed	105 kt (194 km/h; 121 mph)
Max cruising speed at 75% power:	
160	128 kt (237 km/h; 147 mph)
Econ cruising speed at: FL 80	115 kt (213 km/h; 132 mph)
Stalling speed, power off:	
flaps up	57 kt (106 km/h; 66 mph)
flaps down	48 kt (89 km/h; 56 mph)
Max rate of climb at S/L	259 m (850 ft)/min
Service ceiling	5,000 m (16,400 ft)
T-O run	280 m (919 ft)
T-O to 15 m (50 ft)	350 m (1,150 ft)
Landing from 15 m (50 ft)	450 m (1,480 ft)
Landing run	230 m (755 ft)
Range with max fuel	370 n miles (685 km; 425 miles)
g limits	+3.8/-1.5

TAPANEE

TAPANEE AVIATION INC

437 Route 309 Nord, Mont St-Michel, Québec J0W 1P0

Tel: (+1 819) 586 20 59

Fax: (+1 819) 586 27 48

e-mail: info@tapanee.com

Web: www.tapanee.com

DESIGNER: Michel Lequin

The company's most recent known design is the Levitation 4, although the earlier Pégazair STOL bushplane remains available as kit or plans; 32 built by end 2005.

TAPANEE LEVITATION 4

TYPE: Four-seat kitbuilt.

PROGRAMME: Prototype (C-GJUY) flown 2002.

CUSTOMERS: Five kits sold by December 2004; three flying by December 2005.

COSTS: Kit CAD40,000 (2006).



Tapanee Levitation 4 (Paul Jackson)

1159057

DESIGN FEATURES: Extrapolation of Pégazair, with deeper fuselage. High-mounted, parallel-chord wings with V-strut bracing and STOL optimisation including Handley Page leading-edge slats. Large rear surfaces for low-speed control, including sweptback fin with large ventral fillet and tailplane attached below. Quoted build time 1,500 hours.

FLYING CONTROLS: Manual. Junkers flaperons. All-moving fin and tailplane, latter having two anti-balance tabs.

STRUCTURE: Welded steel tube with aluminium skin. All metal wing and horizontal tail.

LANDING GEAR: Tailwheel type; fixed. Two fared-in, hinged side Vs, plus half-axes sprung under centreline with rubber-in-compression shock-absorbers; steerable tailwheel. Mainwheels 8.00-6. Hydraulic brakes.

POWER PLANT: One 134 kW (180 hp) Textron Lycoming O-360 flat-six, driving a two-blade, Hartzell propeller. Fuel capacity 208 litres (55.0 US gallons; 45.8 Imp gallons); two optional 68 litre (18.0 US gallon; 15.0 Imp gallon) wing tanks can be fitted.

ACCOMMODATION: Four persons in two side-by-side pairs. Upward-hinged door each side.

Large baggage compartment to rear, with large, external (port) door.

DIMENSIONS, EXTERNAL:

Wing span	10.21 m (33 ft 6 in)
Length overall	7.47 m (24 ft 6 in)
Height overall	2.44 m (8 ft 0 in)

DIMENSIONS, INTERNAL:

Cabin max width	1.22 m (4 ft 0 in)
Length	2.77 m (9 ft 1 in)
Baggage area	0.71 m ³ (25.0 cu ft)

AREAS:

Wings, gross	16.72 m ² (180.0 sq ft)
--------------	------------------------------------

WEIGHTS AND LOADINGS:

Weight empty	621 kg (1,368 lb)
Max T-O weight	1,133 kg (2,500 lb)
Max wing loading	67.8 kg/m ² (13.89 lb/sq ft)
Max power loading	8.45 kg/kW (13.89 lb/hp)

PERFORMANCE:

Never-exceed speed (VNE)	113 kt (209 km/h; 130 mph)
Cruising speed	100 kt (185 km/h; 115 mph)
Stalling speed, power on	31 kt (67 km/h; 35 mph)
Max rate of climb	213 m (700 ft)/min
T-O run	122 m (400 ft)
Landing run	91 m (300 ft)
Range	499 n miles (925 km; 575 miles)

ULTRAVIA

ULTRAVIA AERO INTERNATIONAL INC

1715 Arthur-Fecteau, Gatineau, Québec J8R 2Z9

Tel: (+1 819) 669 31 44

Fax: (+1 819) 669 84 06

e-mail: pelican@ultravia.ca

Web: www.ultravia.ca

PRESIDENT: Jean-René Lepage

Ultravia was formed in 1982; began marketing the single-seat Pelican in 1983, adding the two-seat Pelican Club the following year. The Pelican PL was added to the Ultravia line in 1991, followed by the Pelican Sport in 1998. During 2003, the company announced a further model: the TuToR. Ultravia has a 1,486 m² (16,000 sq ft) factory near Ottawa-Gatineau Airport.

ULTRAVIA PELICAN

TYPE: Side-by-side kitbuilt.

PROGRAMME: Original Le Pelican first flown May 1982. The Pelican PL was introduced in 1991 and the Sport in 1998. Meets Transport Canada TP 10141 regulations. Pelican Sport also available as factory-finished aircraft.

CURRENT VERSIONS: **Pelican PL:** Standard ultralight version.

Pelican Sport: Redesigned wing with higher-lift aerofoil, longer span and STOL kit. Comes in three subvariants, depending on operating area: Sport 450 (Europe), Sport 500 (Brazil) and Sport 600 (US, Canada, Australia and Mexico).

Pelican TuToR: Derivative conforming to FAR Pt 23; certification under way during 2003 and expected to be completed in 2004; will also be certified to Canadian chapter 523-VLA standards. Construction of prototype (C-GOOI) began 1996.

Description applies to Pelican Sport 600 unless otherwise indicated.

CUSTOMERS: Over 350 Pelican PLs and 150 Pelican Sports completed and flown by December 2004. Ultravia had built nearly 800 Pelicans of all variants by January 2005, of which up to 40 exported to USA before association with Kolb.

COSTS: PL: standard CAD30,175; fast-build CAD39,425; Sport: standard CAD31,900; fast-build CAD41,350; factory-assembled (minus engine) CAD66,725 (2006).

DESIGN FEATURES: High-wing of constant chord, single bracing strut each side; sweptback fin, with constant-chord tailplane at base. Cantilever landing gear.

Fast-build kit, with 49 per cent of assembly completed, is also available. Quoted build time of standard kit 1,000 hours and of fast-build kit, 500 hours.

FLYING CONTROLS: Conventional and manual. Five position (0 to 45°) flaps. Pelican Sport ailerons droop 10° when full flap deployed. Mechanically operated elevator trim tab, ground-adjustable rudder and aileron tabs. Horn-balanced rudder.



Ultravia Pelican PL assembled by Gary Krysztopik of Newport, Rhode Island (Paul Jackson)

1159058

STRUCTURE: Composites, vacuum-moulded fuselage with rigid PVC core. Single-strut, single-spar, all-metal wing with aluminium-covered control surfaces. Cantilever horizontal tail surfaces. Landing gear legs of 4130 steel.

LANDING GEAR: Fixed tricycle version standard. Fuselage-mounted cantilever mainwheel legs with optional wheel fairings. Steerable nosewheel has bungee suspension and uses Azusa 15 cm (6 in) wheel. Optional tailwheel version uses a Matco WLT-6 or Kolb 10 cm (4 in) tailwheel. Cleveland 5.00-5 mainwheels with disc brakes on both versions. Optional floats and speed fairings.

POWER PLANT: Typically, one 73.5 kW (98.6 hp) Rotax 912 ULS four-cylinder four-stroke driving a three-blade Warp Drive ground-adjustable propeller (two-blade Hoffmann HO17FHM-175 fixed-pitch propeller on TuToR). Other engines can be fitted, including the 59.6 kW (79.9 hp) Rotax 912 UL and 84.6 kW (113.4 hp) Rotax 914 UL. Fuel capacity 91 litres (24.0 US gallons; 20.0 Imp gallons) in two wing tanks, of which 87 litres (23.0 US gallons; 19.2 Imp gallons) usable.

ACCOMMODATION: Pilot and passenger in side-by-side seating. Baggage area behind seats.

SYSTEMS: 12 V 250 W generator.

DIMENSIONS, EXTERNAL:

Wing span: PL	8.99 m (29 ft 6 in)
Sport, TuToR	9.75 m (32 ft 0 in)
Length overall: PL	6.02 m (19 ft 9 in)
Sport	6.07 m (19 ft 11 in)
TuToR	6.15 m (20 ft 2 in)
Height overall, nosewheel configuration	
PL	2.54 m (8 ft 4 in)
Sport	2.59 m (8 ft 6 in)
TuToR	2.62 m (8 ft 7 in)

AREAS:

Wings, gross: PL	10.03 m ² (108.0 sq ft)
Sport, TuToR	10.89 m ² (117.3 sq ft)

WEIGHTS AND LOADINGS:

Weight empty: PL	363–386 kg (800–850 lb)
TuToR	386 kg (850 lb)
Sport	327–340 kg (720–750 lb)
Max T-O weight: PL, TuToR	635 kg (1,400 lb)
Sport	599 kg (1,320 lb)

PERFORMANCE (Rotax 912 ULS engine):

Never-exceed speed (VNE):

PL	142 kt (263 km/h; 163 mph)
Sport	135 kt (250 km/h; 155 mph)
TuToR	136 kt (252 km/h; 157 mph)

Normal cruising speed: PL, Sport	115 kt (213 km/h; 132 mph)
TuToR	110 kt (204 km/h; 127 mph)

Stalling speed, flaps down: PL	44 kt (82 km/h; 51 mph)
Sport	39 kt (73 km/h; 45 mph)
TuToR	43 kt (80 km/h; 50 mph)

Max rate of climb at S/L: PL	366 m (1,200 ft)/min
Sport	411 m (1,350 ft)/min
TuToR	335 m (1,100 ft)/min

Service ceiling: PL, Sport	4,875 m (16,000 ft)
TuToR	4,570 m (15,000 ft)

T-O run: PL, TuToR	183 m (600 ft)
Sport	91 m (300 ft)

Landing run: PL	168 m (550 ft)
Sport	152 m (500 ft)

Range with max fuel:	
PL	695 n miles (1,287 km; 800 miles)
Sport	608 n miles (1,126 km; 700 miles)
TuToR	520 n miles (963 km; 598 miles)

UTIAS

UNIVERSITY OF TORONTO INSTITUTE FOR AEROSPACE STUDIES

4295 Dufferin Street, Toronto, Ontario M3H 5T6

Tel: (+1 416) 667 77 08

Fax: (+1 416) 667 77 99

e-mail: james.delaurier@rogers.com

Web (1): www.ornithopter.net

Web (2): www.ornithopter.ca

RESEARCHER: Prof James D DeLaurier

Development and modification of the Big Flapper ornithopter continued in 2005, including the incorporation of an auxiliary miniature jet engine and further runway test runs in July and August. Flight testing was resumed in July 2006.

UTIAS BIG FLAPPER

TYPE: Ornithopter.

PROGRAMME: Early research resulted 1985 in quarter-scale, hand-launched, engine-powered and radio-controlled flying model; this progressively improved into more efficient model flown 4 September 1991 and recognised by FAI as first successful engine-powered ornithopter. Feasibility study 1993–94 for full-scale prototype, construction of which began 1995; this aircraft (C-GPTR) began taxi tests October 1996 and by 1999 had demonstrated ability to accelerate under own power to more than 43 kt (80 km/h; 50 mph) and make a number of brief hops. Further activity suspended in third quarter 2002 due to a fractured weld and pending additional funding; main landing gear redesigned in 2003 to improve shock absorption. New gear delivered 15 September 2003, but this too late for that year's test season.

In addition to Toronto University, Project Ornithopter currently has some 16 sponsors including Canadian National Research Council, the Ken Molson Foundation and Toronto Aerospace Museum. Criterion for success is considered to be sustained flight of at least 11 seconds which, including take-off and landing runs, would cover the length of the runway.

During second quarter of 2004, consideration began to be given to adoption of a miniature turbojet to provide extra boost for take-off, it being felt that this could be achieved with a low flapping frequency, the jet then being shut down once airborne and flapping frequency increased to provide sustained flight. Accordingly, a suitable engine was ordered, and the remainder of the 2004 season was spent in devising a mounting and installing control wiring, electronic control unit, instrumentation and propane fuel tank. A successful static test of the new combined propulsion system was conducted in late 2004.

Further detail refinements were made in May and June 2005, leading to an initial runway test on 17 July. This was followed by further minor modifications and a second test run, at higher flapping frequency, on 3 August 2005. Pilot Jack Sanderson reported himself "very much in control" during these brief lift-offs. However, a further 2005 attempt, which it was hoped would achieve a 1.0 Hz flapping frequency and sustained flight, had to be postponed due to an ignition problem with the jet engine caused by electromagnetic radiation, and weather conditions then deteriorated.

During late 2005/early 2006, engine ignition underwent conversion by AMT Netherlands from digital to analogue system. Runway tests resumed on 8 July 2006. After a few brief hops, the aircraft remained airborne for a sustained (though still jet-assisted) flight of 14 seconds on its fifth lift-off that day, reaching a height of more than 1 metre (3.3 ft) and covering a distance of approximately one-third of a kilometre (0.2 miles) before roll divergence caused it to be landed for safety reasons, sustaining minor damage to the nose gear during the touchdown. At first, the roll divergence was thought to be due to rising crosswinds, but post-flight study of video revealed buckling of a portion of the port wing to be the cause. Despite this, the flight was described as "surprisingly smooth and stable". The company also points out that the present wing was optimised for a lower aircraft weight than that of the current demonstrator.

Further plans for 2006 were to display the aircraft in the Toronto Aerospace Museum. COSTS: Development costs of full-size prototype GBP140,000 up to mid-2002.

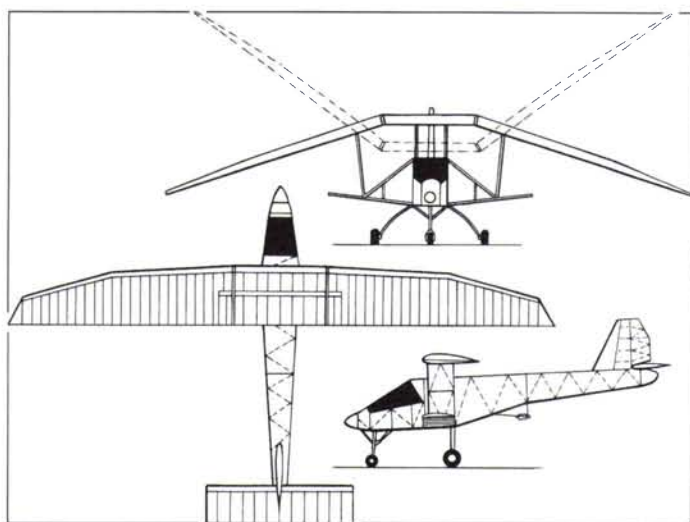
DESIGN FEATURES: Conventional fuselage and tail unit. Flapping wings are hinged to a centre-section which is moved up and down by pylons connected to the drive train and pivot on the ends of vertical struts mounted on short outriggers attached to the base of the fuselage. Thus, when centre-section pushes up, wings flap down, and vice versa. The designed wing deflection is 53° 36', although compliance in the structure under flapping loads gives somewhat larger actual values. The wings are designed to flap 1.2 times per second.

Specially designed (by Prof Michael Selig) S 1020 wing aerofoil section.



UTIAS Big Flapper making a 14-second flight on 8 July 2006

1158650



General arrangement of the University of Toronto ornithopter (James Goulding)

1158550

FLYING CONTROLS: All of thrust and most of lift created by mechanical flapping of wings. Thrust due mainly to low-pressure region around wing leading-edges, which creates suction. Wings also able to twist passively ('aeroelastic tailoring') to prevent airflow separation.

Rudder provides control in roll as well as yaw, due to wing opposite direction of yaw gaining lift while that of other wing loses lift.

STRUCTURE: Fuselage frame of steel tube and aluminium; wings of Kevlar, carbon fibre and epoxy resin, plus wood and structural foam, Dacron overall covering. Original wing was optimised for 272 kg (600 lb) aircraft weight; to offset actual (higher) weight, a pair of small, fixed, auxiliary wings has been added as a temporary solution. Design study for larger replacement wing completed in mid-2003, but not yet funded.

LANDING GEAR: Tricycle type, fixed, with cantilever, self-sprung carbon fibre mainwheel bows; shock-absorption on nosewheel leg. Gear designed to give aircraft a nose-down attitude on ground, to minimise bounce during take-off run. New (2003) main gear has more 'bow-legged' appearance in order to reduce peel-stress concentrations in laminated carbon fibre construction.

POWER PLANT: One 17.9 kW (24 hp) König three-cylinder, two-stroke, fan-cooled semi-radial engine, with magneto ignition and 60:1 reduction gear drive to power wing centre-section. As latter requires more power on upstrokes than on downstrokes (outer wing panels operating in opposite direction), engine stores energy on flywheel between downstrokes. Auxiliary take-off boost provided by 0.27 kN (60 lb st) AMT Olympus turbojet.

ACCOMMODATION: Pilot only.

DIMENSIONS, EXTERNAL (approx):

Wing span	12.3 m (40 ft 6 in)
Length overall	7.3 m (24 ft 0 in)
Height overall	2.7 m (9 ft 0 in)

WEIGHTS AND LOADINGS:

Weight empty (König engine only)	290 kg (640 lb)
Fuel weight (for König engine)	approx 4.5 kg (10 lb)
Olympus engine weight	2.5 kg (5.5 lb)
Max T-O weight	363 kg (800 lb)

PERFORMANCE:

Unstick speed (estimated) at flapping frequency of 1.0 Hz	50 kt (92 km/h; 57 mph)
Cruising speed (8 July 2006 flight)	48 kt (88.5 km/h; 55 mph)
Speed with max jet thrust achieved in 2005:	
flapping frequency 0.7 Hz	37 kt (69 km/h; 43 mph) IAS
flapping frequency 0.9 Hz	43 kt (80 km/h; 50 mph) IAS

VIKING

VIKING AIR LTD

9574 Hampden Road, Sidney, British Columbia V8L 5V5

Tel: (+1 250) 656 72 27

Fax: (+1 250) 656 06 73

e-mail: vikair@islandnet.com

PRESIDENT AND CEO: David Curtis

VICE-PRESIDENT, FINANCE AND ADMINISTRATION: Keith Middleton

TECHNICAL SALES MANAGER: Mike LaFleur

Formed in 1970 to undertake fixed- and rotary-wing aircraft parts fabrication, overhaul, modification and repair, including DHC-2 Beaver and DHC-6 Twin Otter. Plant covers 13,935 m² (150,000 sq ft).

On 22 February 2006, Viking announced it had acquired Type Certificates for seven out-of-production de Havilland Canada aircraft (DHC-1 to DHC-7) from Bombardier Aerospace on 31 January 2006. It then began assessing market interest in relaunched manufacture of Twin Otters, its spare parts support activities for this aircraft meaning that 35 per cent of the airframe remained in production at that time.

VIKING DHC-6 TWIN OTTER 400

TYPE: Twin-turboprop light transport.

PROGRAMME: Design started in January 1964 and construction in November of that year. Prototype (CF-DHC-X) flew in May 1965; Canadian certification 7 April 1966; first delivery in July 1966. Main production series were 100 (115 built, including prototypes), 200 (117 built) and 300 (612 built), last of which completed in December 1988. Some 550 remain in service.

Production rights acquired from Bombardier in 31 January 2006 and new Series 400 version offered. Assembly of first aircraft targeted for third quarter of 2008; work shared between facilities in Calgary and Vancouver.

CURRENT VERSIONS: **Series 400:** Revised version offered by Viking in 2006. P&WC PT6A-34 engines, upgraded avionics and systems.

CUSTOMERS: Production of first three series covered 844, including prototypes. No orders accepted for Viking version, pending formal launch.

COSTS: USD2 million (2007).

DESIGN FEATURES: High-set, constant-chord wing with streamlined strut bracing; cruciform empennage with sweptback fin and constant-chord tailplane.

Wing-section NACA 6A series mean line; NACA 0016 (mod) thickness distribution. Dihedral 3°.

FLYING CONTROLS: Conventional and manual. Double-slotted full-span trailing-edge flaps. Ailerons also droop for use as flaps. Electrically actuated tab in port aileron; geared trim tabs in port and starboard ailerons. Manually operated trim tabs in rudder and elevators. Geared tab is fitted to the rudder to lighten control forces and a tab fitted to the starboard elevator is linked to the flaps to control longitudinal trim during flap retraction and extension.

STRUCTURE: Generally of aluminium alloy. All-metal safe-life structure, each wing being attached to the fuselage by two bolts at the front and rear spar fitting and braced by a single streamline section strut on each side. Light-alloy riveted construction is used throughout except for the upper skin panels which have spanwise corrugated stiffeners bonded to them. Fuselage is a conventional semi-monocoque safe-life structure, in three sections. Primary structure of frames, stringers and skin of aluminium alloy. Windscreen and cabin windows of acrylic plastics. Cabin floor is of low-density aluminium-faced sandwich construction and is designed to accommodate distributed loads of up to 976 kg/m² (200 lb/sq in). Tail unit of high-strength aluminium alloys. Fin and fixed-incidence tailplane are bolted to rear fuselage.

LANDING GEAR: Tricycle type; fixed. Single wheel on each unit. Fully steerable nosewheel. Urethane compression-block shock-absorption on main units. Oleo-pneumatic nosewheel shock-absorber. Mainwheel tyre size 11.00-12; pressure 2.62 bars (38 lb/sq in). Nosewheel tyre size 8.9-12.50, pressure 2.28 bars (33 lb/sq in). Independent, hydraulically operated disc brakes on mainwheels. Alternatively, high-flotation wheels and tyres, for operation in soft field conditions, also available at option size 15.0-12.0 for nosewheel and mainwheels. Provision for alternative wheel-ski landing gear. Twin-float gear accompanied by added wing fences and small auxiliary fins.

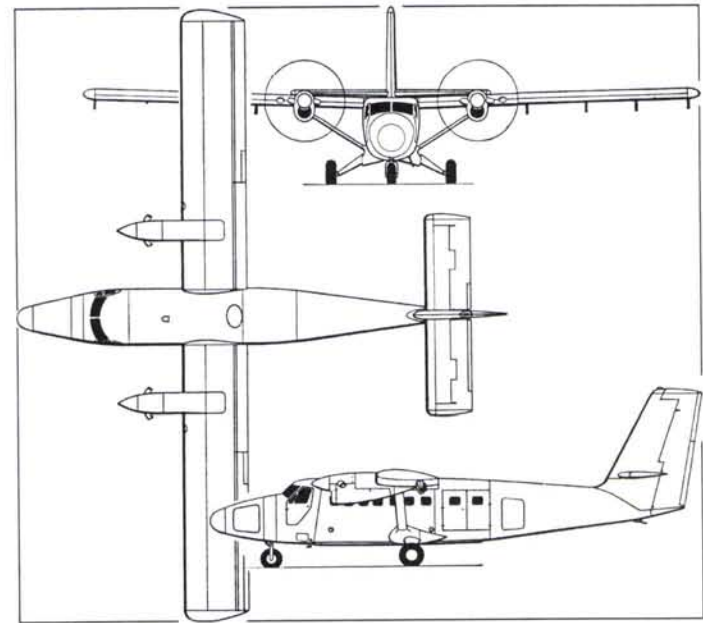
POWER PLANT: Two 559 kW (750 shp) Pratt & Whitney Canada PT6A-34 turboprops, each driving a Hartzell HC-B3TN-3DY three-blade, reversible-pitch fully feathering metal propeller with Beta control (zero-pitch propeller on floatplane). Four-blade propellers under development in 2006. Two underfloor fuel tanks (eight cells), total capacity of 1,442 litres (381 US gallons; 317 Imp gallons). Long-range tank optional in fuselage, providing 337 litres (89.0 US gallons; 74.1 Imp gallons). Refuelling point for each tank on port side of fuselage. Oil capacity 9.1 litres (2.4 US gallons; 2.0 Imp gallons) per engine. Optional electric de-icing system for propellers and air intakes.

ACCOMMODATION: Two pilots on flight deck and up to 20 passengers, or equivalent freight. Flight deck access via forward-opening car-type door on each side or via passenger cabin.



de Havilland Canada DHC-6 Twin Otter from original production

1158817



de Havilland Canada DHC-6 Twin Otter (Dennis Punnett)

1158776

Dual controls standard. Windscreen demisting and defrosting standard. Cabin divided by bulkhead in top main passenger cabin for freight compartment and baggage compartment. Standard interior is 20-seat commuter layout with Douglas track, carpets, double windows, individual air vents and reading lights and airstair door. Optional layouts include 18- or 19-seat commuter versions, and 13/20-passenger utility version with foldaway seats and double cargo doors with ladder. Access to cabin by door on each side of rear fuselage; airstair door on port side. Optional double door for cargo on port side instead of airstair door. Compartments in nose and aft of main cabin, each with upward-hinged door on port side, for 136 kg (300 lb) and 227 kg (500 lb) of baggage respectively; rear baggage hold accessible from cabin in emergency. Emergency exits near front of cabin on each side. Heating of flight deck and passenger cabin by engine bleed air; ventilation via a ram air intake on the port side of the fuselage nose. No pressurisation. Oxygen system for crew and passengers optional. Executive, survey or ambulance interiors optional. Tie-down cargo rings standard for the freighter role.

SYSTEMS: Hydraulic system, pressure 103 bar (1,500 lb/sq in), for flaps, brakes, nosewheel steering and (where fitted) ski retraction mechanism. Hand pump in crew compartment provides emergency pressure for standby or ground operation if the electric pump is inoperative. Accumulators smooth the system pressure pulses and provide pressure for parking and emergency braking. Optional low-pressure pneumatic system (1.24 bars; 18 lb/sq in) for operation of autopilot or wing and tail de-icing boots, if fitted.

Primary electrical system is 28 V DC with one 24 A starter/generator on each engine. One 40 Ah 20-cell Ni/Cd battery (optional 36 Ah lead-acid battery) for emergency power and engine starting. Separate 3.6 Ah battery supplies independent power for engine starting relays and ignition. 250 VA main and standby static inverters provide 400 Hz AC power for instruments and avionics. External DC receptacle aft of port side cabin door permits operation of complete system on the ground. Optional boot de-icing equipment on wing. Optional pneumatic-boot de-icing of tailplane leading-edge.

DIMENSIONS, EXTERNAL:

Wing span	19.81 m (65 ft 0 in)
Wing chord, constant	1.98 m (6 ft 6 in)
Wing aspect ratio	10.1
Length overall: Landplane	15.77 m (51 ft 9 in)
Floatplane	15.09 m (49 ft 6 in)
Height overall: Landplane	5.94 m (19 ft 6 in)
Floatplane from waterline	6.05 m (19 ft 10 in)

Tailplane span	6.30 m (20 ft 8 in)
Wheel track: Landplane	3.71 m (12 ft 2 in)
Wheelbase: Landplane	4.53 m (14 ft 10½ in)
Length of floats: Floatplane	9.65 m (31 ft 8 in)
Width over floats: Floatplane	5.18 m (17 ft 0 in)
Seaplane track (c/l of floats)	4.06 m (13 ft 4 in)
Propeller diameter	2.59 m (8 ft 6 in)
Passenger door (port): Height	1.27 m (4 ft 2 in)
Width	0.76 m (2 ft 6 in)
Height to sill	1.32 m (4 ft 4 in)
Passenger door (stbd): Height	1.16 m (3 ft 9½ in)
Width	0.77 m (2 ft 6¼ in)
Height to sill	1.32 m (4 ft 4 in)
Baggage compartment door (nose)	
Mean height	0.69 m (2 ft ¾ in)
Width	0.76 m (2 ft 6 in)
Height to sill	1.32 m (4 ft 4 in)
Baggage compartment door (port, rear):	
Max height	0.97 m (3 ft 2 in)
Width	0.65 m (2 ft 1½ in)
Height to sill	1.32 m (4 ft 4 in)

DIMENSIONS, INTERNAL:

Cabin, excl flight deck, galley and baggage compartment:	
Length	5.64 m (18 ft 6 in)
Max width	1.61 m (5 ft ¾ in)
Max height	1.50 m (4 ft 11 in)
Floor area	7.45 m² (80.2 sq ft)
Volume	10.87 m³ (384 cu ft)
Baggage compartment (nose):	
Volume	1.08 m³ (38 cu ft)
Baggage compartment (rear):	
Length	1.88 m (6 ft 2 in)
Volume	2.49 m³ (88 cu ft)

AREAS:

Wings, gross	39.02 m² (420 sq ft)
Ailerons (total)	3.08 m² (33.2 sq ft)
Trailing-edge flaps (total)	10.42 m² (112.2 sq ft)
Fin	4.46 m² (48.0 sq ft)
Rudder, incl tabs	3.16 m² (34.0 sq ft)
Tailplane	9.29 m² (100 sq ft)
Elevator, incl tabs	3.25 m² (35.0 sq ft)

WEIGHTS AND LOADINGS:

Basic weight	3,121 kg (6,881 lb)
Max payload:	
for 100 n miles (185 km; 115 miles)	1,941 kg (4,280 lb)
for 400 n miles (740 km; 460 miles)	1,474 kg (3,250 lb)
Max T-O weight	5,670 kg (12,500 lb)
Max landing weight:	
wheels and skis	5,579 kg (12,300 lb)

PERFORMANCE:

Max cruising speed: at S/L	170 kt (315 km/h; 196 mph)
at FL50	181 kt (335 km/h; 208 mph)
at FL100	182 kt (337 km/h; 209 mph)
Stalling speed: flaps up	74 kt (138 km/h; 86 mph)
flaps down	58 kt (108 km/h; 67 mph)
Max rate of climb at S/L	488 m (1,600 ft)/min
Rate of climb at S/L, OEI	104 m (340 ft)/min
Service ceiling	8,140 m (26,700 ft)
Service ceiling, OEI	3,530 m (11,600 ft)
T-O run: STOL	213 m (700 ft)
CAR Pt 3	262 m (860 ft)
T-O to 15 m (50 ft): STOL	366 m (1,200 ft)
CAR Pt 3	457 m (1,500 ft)
Landing from 15 m (50 ft): STOL	320 m (1,050 ft)
CAR Pt 3	591 m (1,940 ft)
Landing run: STOL	157 m (515 ft)
CAR Pt 3	290 m (950 ft)
Ferry range: normal tankage	775 n miles (1,435 km; 891 miles)
long-range tankage	980 n miles (1,815 km; 1,127 miles)

ZENAIR

ZENAIR LTD

PO Box 235, Huronia Airport, Midland, Ontario L4R 4K8
 Tel: (+1 705) 526 28 71
 Fax: (+1 705) 526 80 22
 e-mail: info@zenair.com
 Web: www.zenair.com
 PRESIDENT AND DESIGNER: Christophe Heintz
 VICE-PRESIDENT: Mathieu Heintz
 GENERAL MANAGER: Bruce Barker

Founded in 1974, Zenair designs and develops light aircraft. Christophe Heintz was formerly chief engineer of Avions Pierre Robin in France. In 1992 Zenith Aircraft Company was formed to manufacture and market all versions except the CH 2000 in the USA, and in September 1996 reached full production status. In June 1999, Zenith announced that it was transferring production of the CH 2000 to a new, purpose-built 2,800 m² (30,000 sq ft) factory at Eastman, Georgia: Aircraft Manufacturing and Development Company was formed in the US to produce the aircraft, some of which have been assembled in Jordan by JAI.

Zenair has licensed representatives in Africa, South America, Belgium, Czech Republic (see entry for CZA), France, Germany, Israel, Italy (see ICP), Spain and the UK.

Zenith Aircraft Company (Mexico, Missouri, USA) licenses kit production of Zenair designs. In addition to light aircraft, company constructs metal floats and amphibious floats.

Chile

ENAER

EMPRESA NACIONAL DE AERONÁUTICA DE CHILE

Avenida José Miguel Carrera 11087, El Bosque, Santiago
 Tel: (+56 2) 383 18 73
 Fax: (+56 2) 528 26 99
 e-mail: comercial@enaer.com
 Web: www.enaer.com
 PRESIDENT: Gen Patricio Ros
 CEO: Carlos Traub Gainsborg
 COMMERCIAL DIRECTOR: Ricardo Klima
 PRODUCTION DIRECTOR: Jaime Aravena
 ENGINEERING DIRECTOR: Jorge Alarcón
 MATERIAL DIRECTOR: Pedro González
 MAINTENANCE DIRECTOR: Jorge Vargas
 QUALITY ASSURANCE DIRECTOR: Simón Adjemian
 OPERATIONS MANAGER: Máximo Bascuñan
 SERVICE MAINTENANCE MANAGER: Víctor Dumas
 PRODUCTS MANUFACTURING MANAGER: Juan Carlos Sandoval
 MARKETING MANAGER: Marco Sciolla
 COMMUNICATIONS MANAGER: Luis Filippi

State-owned company, formed 16 March 1984 from IndAer industrial organisation set up 1980 by Chilean Air Force (FACH); aircraft manufacture started 1979 with assembly of 27 Piper PA-28 Dakota lightplanes for Chilean Air Force and flying clubs. Covered plant area 45,000 m² (484,375 sq ft); workforce of 1,470 in early 2006.

Recent main programmes have mainly concerned various military upgrade programmes. Currently undertaking sole-source fin/tailplane manufacture of ERJ-135/140/145 (560 shipsets

ordered) as Embraer risk-sharing partner, and subcontract manufacture of rear ramp and tail unit of EADS CASA CN-235 and C-295; also manufactures nose sections for Eclipse 500 and underfuselage fairings for Dassault Falcon 900 and 2000. Agreement signed in October 2005 for parts manufacture of unspecified aircraft for Hindustan Aeromautics Ltd. In same year, announced plans to become subcontractor on Airbus A400M. Engineering and maintenance activities are qualified to ISO 9001-2000 and AS 9100-2001 standards.

T-35 piston-engined Pillán military trainer, currently operated by eight air arms, continued to be marketed in 2006.

ENAER (ECH-51) T-35 PILLÁN

English name: Devil

Spanish Air Force designation: E.26 Tamiz (Grader)

TYPE: Basic prop trainer.

PROGRAMME: First two prototypes (first flight 6 March 1981) developed by Piper; followed by three Piper kits for ENAER assembly (first flight, by FACH s/n 101, 30 January 1982); then slight redesign. ENAER series production started September 1984; first flight of production T-35A, 28 December 1984. Deliveries to FACH began 31 July 1985; original export deliveries completed 1991. Increased-span Pillán 2000, proposed in 1998, did not materialise. Production resumed in November 1998 to build eight for Dominican Republic and again in 2002 to meet an Ecuadorian Navy order for four. Promotion of Turbo Pillán continued at FIDAE Air Show in April 2002, but no further orders by late 2003, when further six Pilláns (c/n 235 to 240) then on production line, presumably against unannounced or anticipated future orders.

Promotion to air forces of Argentina, Brazil, Colombia, Ecuador, South Africa and Tunisia continued in 2005, though no new orders announced by early 2006. Meanwhile, agreement signed in May 2004 provides for EADS to market Pillán in Europe, subject to wing and tail modifications to improve handling.

China

ACAC

AVIC I COMMERCIAL AIRCRAFT COMPANY

22-23/F Business Building, Zhaofeng Plaza, 1027 Changning Road, Changning District, Shanghai 200050
 Tel: (+86 21) 52 41 37 37
 Fax: (+86 21) 52 41 37 71
 e-mail: business@acac.com.cn
 Web: www.acac.com.cn
 MAJOR PARTICIPATING COMPANIES:
 Chengdu Aircraft Industry Group (CAC)
 Shanghai Aircraft Research Institute (SARI)
 Shanghai Aircraft Industry Company (SAIC)
 Shenyang Aircraft Corporation (SAC)
 Xian Aircraft Design and Research Institute (XADRI)
 Xian Aircraft Company (XAC)
 CHAIRMAN: Yang Yuzhong
 PRESIDENT: Zheng Qiang
 VICE-PRESIDENTS:
 Tao Zhihai
 Chen Jin
 PROJECT MANAGER: Ms Wang Lan

Six Chinese organisations formed a consortium in 1998 to study the prospects of launching, with risk-sharing foreign industrial partners, a programme for a new regional jet in the 70-seat class. Initial concepts were focused on 58-seat (NRJ 58) and 76-seat (NRJ 76) variants. However, the latter project received the designation ARJ21 (Advanced Regional Jet, 21st Century) in 2001 and State Council approval in June 2002.

ACAC was formed in October 2002 to manage this programme and is now a limited liability company with joint investment from AVIC I and 14 other aviation institutes and enterprises. Foundation stone laid 26 December 2005 for 18,000 m² (193,750 sq ft) customer service centre in Shanghai; completion due by June 2007. ACAC also plans new 54,000 m² (581,250 sq ft) headquarters and technical centre at Zizhu Science Based Industrial Park.

ACAC ARJ21

TYPE: Regional jet airliner.

PROGRAMME: Project officially launched by AVIC I on 7 November 2000 as USD700 million programme under the auspices of a newly created New Regional Jet Programme Management Company. Aircraft was renamed ARJ21 (Advanced Regional Jet, 21st century) in 2001 and allocated initial investments from AVIC I (CNY20 million); CAC, SAIC and XAC (each CNY5 million); and SAC (CNY3 million). Further investment is being sought from other Chinese and foreign companies. The parent company is responsible for defining airframe configuration; defining and subcontracting work-shares; schedule and quality control; final assembly, certification, marketing and customer support. Programme go-ahead approved by Chinese government June 2002; announced October 2002 with formation of ACAC and allocation of CNY5.2 billion (USD650 million) start-up funding;



Model of ACAC ARJ21-700 (Paul Jackson)

1153802



Stretched ACAC ARJ21-900 (Paul Jackson)

1153801

Boeing to provide engineering support. Manufacture at seven factories, including Xian and Shanghai; final assembly at Shanghai. Selection of General Electric CF34 announced 5 November 2002. Manufacture of components for static test prototype ARJ21-700 began simultaneously at Chengdu, Shanghai and Xian plants on 20 December 2003; first CAC-built nose section delivered in late December 2006; final assembly due to begin in March 2007. First flight targeted for March 2008 Chinese certification for September 2009 (with FAA to follow) and service entry by end of 2009.

CURRENT VERSIONS: **ARJ21-700**: Baseline version, seating 78 to 90 passengers.

ARJ21-700F: Freight version of -700. Capacity for five LD7 containers or PIP pallets.

ARJ21-700B: Corporate shuttle/large business jet variant of -700, typically configured for 20 passengers.

ARJ21-900: Stretched version, with seats for 98 to 105 passengers. Go-ahead anticipated in early 2007.

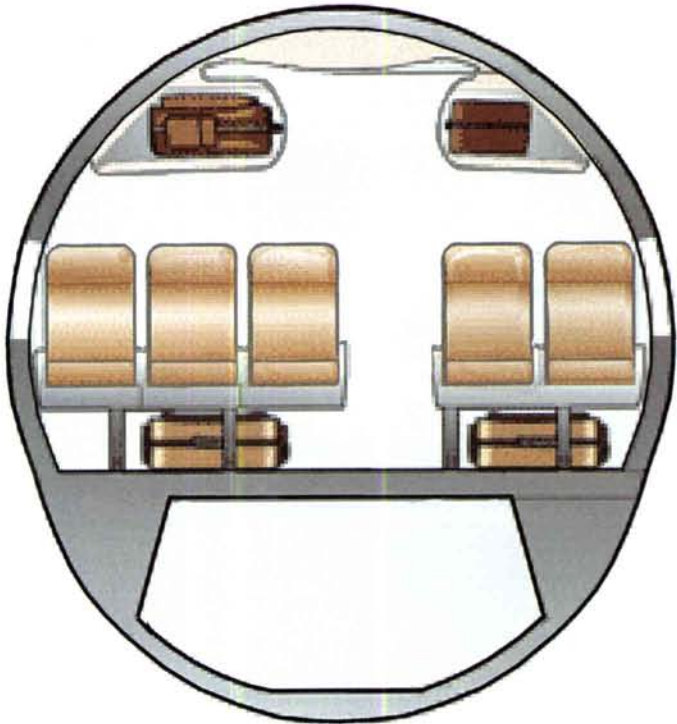
CUSTOMERS: Total of 41 ordered by June 2006, including Shandong Airlines (launch operator, 10), Shanghai Airlines (launch customer, five) and Shenzhen Financial Leasing Company (20). Estimated sale of 500 (350 domestic and 150 export) over 20 years. SE Leasing Company of Shanghai has option for 20; Xiamen Airlines has option for six.

DESIGN FEATURES: Low, swept wing (25° at quarter-chord) with winglets; engines pod-mounted to rear fuselage; all-swept T tail.

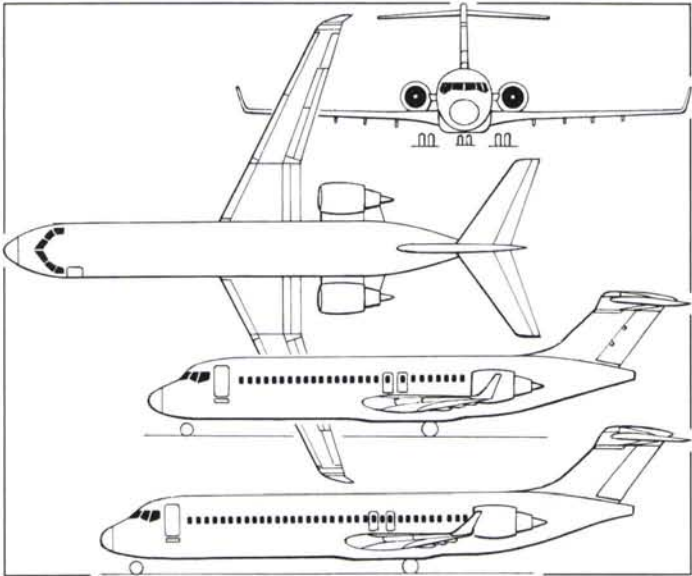
Supercritical wing section being designed and wind tunnel tested by Antonov design bureau. Wings 3° dihedral, tailplane 3° anhedral.



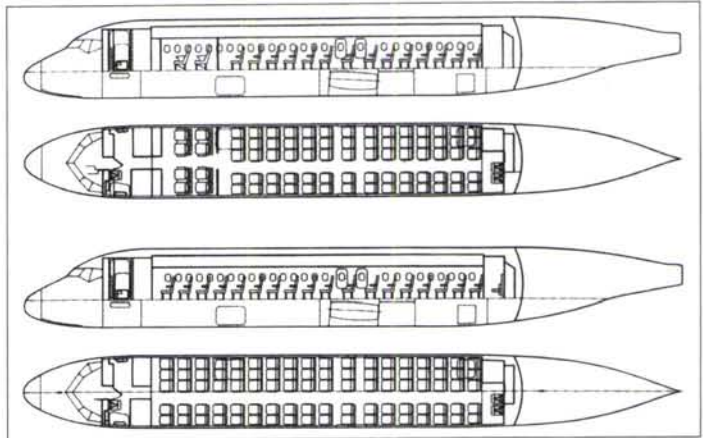
ARJ21 flight deck mockup 0558609



Cross-section of ACAC ARJ21 fuselage 1153800



Baseline ARJ21-700, with additional side view of the stretched ARJ21-900 (James Goulding) 1158975



Alternative single- and two-class seating arrangements for ACAC ARJ21-700 1151998

FLYING CONTROLS: Honeywell/Parker Aerospace electrically actuated (fly-by-wire) ailerons, elevators and rudder; no mechanical back-up. Three-segment leading-edge flaps. Two-segment trailing-edge flaps, with single spoiler/lift dumper forward of inboard flap and three-segment spoilers forward of each outer flap. Hamilton Sundstrand flap and slat actuation.

STRUCTURE: Wings and centre-fuselage by Xian (XAC); CAC (nose); SAC (Shenyang) (engine pylons and tailfin); tailplane and final assembly by Shanghai (SAMF). Design life 60,000 flight hours or 20 calendar years.

LANDING GEAR: Liebherr Aerospace and Aircraft Braking Systems retractable tricycle type, with twin wheels on each unit. Goodrich tyres and brakes.

POWER PLANT: ARJ21-700: Two 68.2 kN (15,332 lb st) rear-mounted General Electric CF34-10A turbofans with FADEC. Smiths Aerospace thrust reverser actuators. Standard fuel capacity 12,719 litres (3,360 US gallons; 2,798 Imp gallons).

ARJ21-900: CF34-10A engines rated at 75.9 kN (17,057 lb st), otherwise as for -700. Fuel capacity (-900STD) as for -700; increased by approx 5 per cent in -900ER.

ACCOMMODATION: Flight crew of two, plus two cabin attendants. Five-abreast seating for up to 90 (in ARJ21-700) or 105 (ARJ21-900) passengers in all-economy basic layout at 81 cm (32 in) pitch. Alternative mixed class configuration offers eight-seat business section (two rows, four abreast, at 96.5 cm; 38 in pitch) at front, with 70 and 90 economy class, respectively, to rear. Galleys (two), wardrobe, storage area and lavatory at front of cabin; second storage area and lavatory at rear. Type I passenger door at front on port side, with Type I service door opposite; two Type III emergency exits over wing on each side. Underfloor baggage door forward and aft of wing on starboard side. Large cargo door (forward, port) on 700F.

SYSTEMS: Parker Aerospace hydraulic and fuel systems. Hamilton Sundstrand APS 2300 APU, electrical power generation and distribution system (115 V AC from three 40 kVA generators; two engine-driven and one APU-driven), and emergency ram-air turbine. Liebherr Aerospace air conditioning, de-icing and bleed air systems. Sagem cabin systems; Kidde fire protection system.

AVIONICS: Pro Line 21 suite selected April 2003; first set delivered mid-2006; Rockwell Collins also serving as avionics system integrator. Suite includes VHF-4000 voice/data receiver, RIU-4000, five 254 x 203 mm (10 x 8 in) LCDs, EICAS, solid-state weather radar, TCAS, AHS-3000 and FMS-4500. Eaton Corporation flight deck panel assemblies and lighting controls.

DIMENSIONS, EXTERNAL (A: ARJ21-700, B: ARJ21-900):

Wing span over winglets: A, B	27.29 m (89 ft 6½ in)
Wing aspect ratio	9.3
Length overall: A	33.465 m (109 ft 9½ in)
B	36.36 m (119 ft 3½ in)
Fuselage length: A	30.43 m (99 ft 10 in)
B	33.325 m (109 ft 4 in)

Height overall: A, B	8.44 m (27 ft 8¼ in)
Tailplane span: A, B	10.495 m (34 ft 5¼ in)
Wheel track (c/l of shock-struts):	
A, B	4.68 m (15 ft 4¼ in)
Wheelbase: A	14.88 m (48 ft 9¾ in)
B	16.80 m (55 ft 1½ in)
Passenger door (fwd, port): Height	1.83 m (6 ft 0 in)
Width	0.86 m (2 ft 10 in)
Service door (fwd, stbd): Height	1.22 m (4 ft 0 in)
Width	0.69 m (2 ft 3 in)
Overwing emergency exits (four, each):	
Height	0.91 m (3 ft 0 in)
Width	0.51 m (1 ft 8 in)

DIMENSIONS, INTERNAL:

Passenger cabin: Max width	3.145 m (10 ft 3¾ in)
Aisle width	0.485 m (1 ft 7 in)
Max height	2.03 m (6 ft 8 in)
Cargo hold (700F):	
Length	19.035 m (62 ft 5½ in)
Volume	111.3 m³ (3,931 cu ft)

AREAS:

Wings, gross	79.86 m² (859.6 sq ft)
--------------	------------------------

WEIGHTS AND LOADINGS:

Operating weight empty:	
700STD, 700ER	24,955 kg (55,016 lb)
700F	26,355 kg (58,103 lb)
700B	25,755 kg (56,780 lb)
900STD	26,270 kg (57,915 lb)
900ER	26,770 kg (59,018 lb)
Max standard fuel weight: 700STD, 700ER, 700F, 900STD	10,386 kg (22,897 lb)
700B	16,386 kg (36,125 lb)
900ER	10,886 kg (23,999 lb)
Max payload: 700STD, 700ER	8,935 kg (19,698 lb)
700F	10,150 kg (22,377 lb)
700B	3,000 kg (6,614 lb)
900STD, 900ER	11,246 kg (24,793 lb)
Max T-O weight:	
700STD	40,500 kg (89,287 lb)

700ER, 700F, 700B	43,500 kg (95,901 lb)
900STD	43,616 kg (96,156 lb)
900ER	47,182 kg (104,018 lb)
Max ramp weight:	
700STD	40,589 kg (89,483 lb)
700ER, 700F, 700B	43,589 kg (96,097 lb)
900STD	43,706 kg (96,355 lb)
900ER	47,272 kg (104,217 lb)
Max landing weight:	
700STD	37,665 kg (83,037 lb)
700ER, 700F, 700B	40,455 kg (89,188 lb)
900STD	40,563 kg (89,426 lb)
900ER	43,879 kg (96,737 lb)
Max zero-fuel weight:	
700STD, 700ER	33,890 kg (74,715 lb)
700F	36,505 kg (80,480 lb)
700B	28,755 kg (63,394 lb)
900 STD	37,516 kg (82,709 lb)
900ER	38,016 kg (83,811 lb)
Max wing loading:	
700STD	507.1 kg/m ² (103.87 lb/sq ft)
700ER, 700F, 700B	544.7 kg/m ² (111.56 lb/sq ft)
900STD	546.2 kg/m ² (111.86 lb/sq ft)
900ER	590.8 kg/m ² (121.01 lb/sq ft)
Max power loading:	
700STD	297 kg/kN (2.91 lb/lb st)

700ER, 700F, 700B	319 kg/kN (3.13 lb/lb st)
900STD	287 kg/kN (2.82 lb/lb st)
900ER	311 kg/kN (3.05 lb/lb st)
PERFORMANCE (estimated):	
Max operating Mach number (Mmo): all	0.82
Max operating speed (VMO): all	330 kt (611 km/h; 379 mph) CAS
Max operating altitude: all	11,900 m (39,040 ft)
Service ceiling, OEI: all	6,200 m (20,340 ft)
T-O field length at S/L, ISA:	
700STD	1,700 m (5,580 ft)
700ER	1,900 m (6,235 ft)
900STD	1,750 m (5,740 ft)
900ER	1,950 m (6,400 ft)
Landing field length at MLW at S/L, ISA:	
700STD	1,550 m (5,085 ft)
700ER	1,650 m (5,415 ft)
900STD	1,600 m (5,250 ft)
900ER	1,700 m (5,580 ft)
Range with max payload:	
700STD, 900STD	1,200 n miles (2,222 km; 1,380 miles)
700ER	2,000 n miles (3,704 km; 2,301 miles)
900ER	1,800 n miles (3,333 km; 2,071 miles)
Range with 85% payload:	
700F	1,800 n miles (3,333 km; 2,071 miles)
700B	3,300 n miles (6,111 km; 3,797 miles)

AVIC

CHINA AVIATION INDUSTRY CORPORATION (ZHONGGUO HANGKONG GONGYE ZONGGONGSI) AVIC I

2 Dongsanhuan Nanlu, Chaoyangqu, Beijing 1000022

Tel: (+86 10) 65 66 59 22

Fax: (+86 10) 65 66 65 18

e-mail: lixm@avic1.com.cn

Web: www.avic1.com.cn

PRESIDENT: Liu Gaozhao

SENIOR VICE-PRESIDENTS:

Yang Yuzhong

Gu Huizhong

VICE-PRESIDENTS:

Xu Huangang

Lin Zuoming

Hu Wenming

Zheng Rongsheng

Geng Ruguang

Liu Sicheng

DIRECTOR-GENERAL OF MARKETING: Tang Xiaoping

AVIC II

67 Jiao Nan Street (PO Box 33), Beijing 100712

Tel: (+86 10) 64 01 36 45

Fax: (+86 10) 64 03 21 09

e-mail: international@avic2.com.cn

Web: www.avic2.com.cn

PRESIDENT: Zhang Hongbiao

VICE-PRESIDENTS:

Song Jingang

Xu Zhanbin

DIRECTOR-GENERAL OF MARKETING: Cui Degang

INTERNATIONAL MARKETING

CATIC (Zhongguo Hangkong Jishu Jinchukou Zonggongsi: China National Aero-Technology Import and Export Corporation)

CATIC Plaza, 18 Beichen Dong Street, Chaoyang District, Beijing 100101

Tel: (+86 10) 84 97 22 55 and 84 97 09 68

Fax: (+86 10) 84 97 10 88

e-mail: webmaster@catic.com.cn

Web: www.catic.com.cn

PRESIDENT: Fushu La

VICE-PRESIDENT, EXPORTS: Ding Shiqing

DIRECTOR, PUBLIC RELATIONS: Bi Jianfa

Present Chinese aviation industry created in 1951 and has since manufactured some 14,000 aircraft (including more than 10,000 military), more than 50,000 aero-engines and 10,000 air-to-air and tactical missiles. Some 700 aircraft have been exported, approximately 10 per cent of them civil types.

Former Ministry of Aero-Space Industry abolished 1993 and AVIC created on 26 June 1993 as economic entity to develop market economy and expand international collaboration in aviation programmes. CATIC Group formed 26 August 1993, with CATIC (founded January 1979) as its core company, to be responsible for import and export of aero and non-aero products, subcontract work and joint ventures.

Xian, Chengdu, Shanghai, Shenyang, Harbin and other factories carry out subcontract work on Airbus A300/318/320; ATR 72; Boeing 737/747/757; Bombardier Dash 8Q; and Bombardier 415. Licensed manufacture of Sukhoi Su-27s is undertaken at Shenyang. Co-development with UK/France/Italy and Singapore of AE-100 regional airliner abandoned in 1998 and replaced by AVIC I's ARJ21 project (managed by ACAC); AVIC II programme for smaller regional jet now being met by co-production of Embraer ERJ-135/140/145 family by Harbin Embraer Aircraft Industry (HEAI).

Total workforce of aerospace industry was reduced to about 500,000 in 1998, when about 34,000 workers were made redundant and some 14,000 others transferred to non-aerospace activities. AVIC's President announced plans at Airshow China in November 1998 to restructure aircraft industry into two "competing and co-operating" groups in the near future. Draft organisation plan submitted to State Council in February 1999, resulting in division of AVIC into two separate companies (AVIC I and II) with effect from July 1999. Each of these companies has a 50 per cent shareholding in China Aviation Supply and Marketing Corporation (CASM) and CATIC.

AVIC I comprises 47 industrial enterprises (236,000 workforce) and 31 research institutes (45,000 workforce), plus 22 other specialised companies or institutions. Activities include more than 3,000 non-aerospace products in eight categories, including industrial gas turbines; cars; motorcycles; refrigeration equipment; and environmental materials. It also undertakes aircraft leasing, general aviation services, and management of national aircraft verification and flight testing.

AVIC I principal aviation entities:

AVIC I Commercial Aircraft Company (ACAC) (ARJ21)

Chengdu Aircraft Design Institute

Chengdu Aircraft Industries Group (J-7/F-7, FC-1/JF-17 and J-10)

China Air-to-Air Missile Research Institute

China Flight Test Establishment

China Gas Turbine Establishment

Guizhou Aviation Industries Group (JJ-7/FT-7; JL-9/CY-1/FC-16; jet engines; missiles)

Shanghai Aero-Engine Manufacturing Plant

Shanghai Aircraft Manufacturing Factory

Shanghai Aircraft Research Institute

Shanghai Aviation Industries Group (airliner subcontracts)

Shenyang Aero-Engine Research Institute

Shenyang Aircraft Industries Group (J-8/F-8, J-11/Su-27 and 'J-X'; civil subcontracts)

Shenyang Aero-Engine Research Institute

Shenyang Liming Engine Manufacturing Corporation

Xian Aero-Engine Corporation (WP8 and WS9)

Xian Aircraft Design and Research Institute

Xian Aircraft Industries Group (JH-7/FBC-1, WJ and MA60)

AVIC II, by comparison, owns a total of 81 subordinate industrial enterprises, research institutes and other organisations which between them have produced more than 6,100 aircraft (including about 660 helicopters), 23,600 aero-engines and some 10,000 tactical missiles since 1951, in addition to large numbers of road vehicles and other non-aeronautical products. Its aviation activities are undertaken by five divisions, respectively specialising in aircraft; aero-engines; helicopters; airborne equipment; and civil aircraft market development.

AVIC II was stated in mid-2002 to have government approval to float its non-military business on the Hong Kong Stock Exchange; to this end, new company AviChina Industry and Technology created in 2003; in October 2003, a 5 per cent stake in this company was acquired by EADS. In same year, new MoU signed with Antonov, to pursue possibility of producing An-70 and An-124-300 in China. MoU with Eurocopter in 2004 for joint development of a new 7,000 kg (15,432 lb) class helicopter (EC 175, provisional designation Z-12) as replacement for Sikorsky S-70C-2 Black Hawk.

AVIC II principal aviation entities:

Baoding Propeller Factory

Changhe Aircraft Industries Group (Z-8 and Z-11)

Changzhou Aircraft Factory

Chengdu Engine Company (WP7 and WP13)

China Helicopter Research and Development Institute (Z-10 and 'Z-12')

Dongan Engine Company (WJ5)

Harbin Aircraft Industries Group (Hafei Z-9, 'Z-X' and Y-12)

Hongdu Aviation Industries Group (JL-8/K-8 and L-15)

Shaanxi Aircraft Industries Group (Y-8 and Y-9)

Shijiazhuang Aircraft Industry Corporation (Y-5, LE-500 and LE-800)

South Aero-Engine Company (HS5, WJ6 and WZ8)

Zhuzhou Aviation Power Plant Research Institute

CAC

CHENGDU AIRCRAFT INDUSTRY GROUP
(CHENGDU FEIJI GONGYE GONGSI)
(SUBSIDIARY OF AVIC I)

Huangtianba (PO Box 800), Chengdu, Sichuan 610092

Tel: (+86 28) 87 40 41 14

Fax: (+86 28) 87 41 56 34

e-mail: caca@mail.cac.com.cn

Web: www.cac.com.cn

CHAIRMAN AND PRESIDENT: Luo Ronghuai

DEPUTY GENERAL MANAGER: Li Shaoming

DEVELOPMENT DIRECTOR: Li Pei

DIRECTOR, INTERNATIONAL CO-OPERATION DIVISION: Wang Yinggong

Major centre for fighter development and production, founded 1958; has since built over 2,000 fighters of more than 10 models or variants; current facility occupies site area of 462 ha (1,142 acres). Production continues of some variants of J-7/F-7 fighter series; newer J-10 and FC-1 fighters currently under development and/or early production and service. Chengdu also thought to be in concept stage of an advanced combat aircraft, possibly to the same 'XXJ' outline requirement as SAC (Shenyang). CAC design reportedly in conjunction with No. 611 Institute; possibly of tail-less delta planform, with canards. In 2001, CAC was named as a risk-sharing partner in the ACAC ARJ21 regional jet programme.

Subcontract work includes passenger doors for the Airbus A320; wing components for Boeing 737/747; rear fuselages and tail surfaces for Boeing 757 (with 787 rudder to follow); and fuselage components for Dassault Falcon 2000EX. Non-aerospace products account for a large percentage of current output.

CAC J-7

Chinese name: Jianji-7 (Fighter aircraft 7)

Westernised designation: F-7

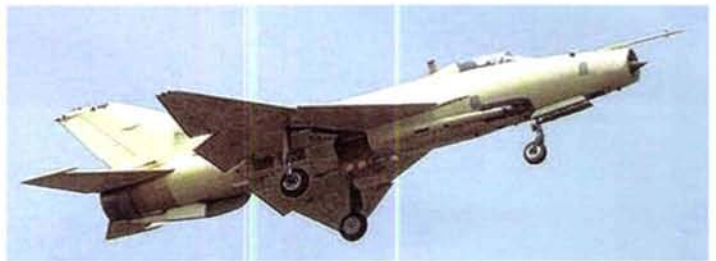
TYPE: Multirole fighter.

PROGRAMME: Origins of MiG-21 licensed manufacture in China (1961-67) detailed in earlier editions. Chengdu production of J-7 I began June 1967 (first flight 16 June 1969 but not accepted in large numbers); development of J-7 II began 1975, followed by first flight 30 December 1978 and production approval September 1979; development of F-7M and J-7 III started 1981; J-7 III first flight 26 April 1984; F-7M (first flight 31 August 1983) revealed publicly October 1984, production go-ahead December 1984, named Airguard early 1986; first F-7P deliveries to Pakistan 1988; first F-7MPs to Pakistan mid-1989; F-7MG public debut November 1996; J-7FS revealed September 1998 and F-7MF November 2000. Latest reported domestic version is J-7G, first flown June 2002.

CURRENT VERSIONS (DOMESTIC): **J-7B (originally J-7 II)**: Modified and improved J-7 I; WP7B turbojet of increased thrust (43.2 kN; 9,700 lb st dry, 59.8 kN; 13,450 lb st with afterburning); 720 litre (190 US gallon; 158 Imp gallon) centreline drop tank for increased range; brake-chute relocated at base of rudder to improve landing performance and shorten run; rear-hinged canopy, jettisoned before ejection seat deploys; new Chengdu Type II seat operable at zero height and speeds down to 135 kt (250 km/h; 155 mph); and new Lanzhou compass system. Small batch production (typically, 14 in 1989), notwithstanding advent of J-7 III and J-7E.

J-7C (originally J-7 III): Chinese equivalent of MiG-21MF, with blown flaps and all-weather, day/night capability. Main improvements are change to WP13 engine with greater power; additional fuel in deeper dorsal spine; JL-7 (J-band) interception radar, with correspondingly larger nose intake and centrebody radome; sideways-opening (to starboard) canopy, with centrally located rearview mirror; improved HTY-4 low-speed/zero height ejection seat; more advanced fire-control system; twin-barrel 23 mm gun under fuselage (with HK-03D optical gunsight); broader-chord vertical tail surfaces, incorporating antennas for LJ-2 omnidirectional RWR in hemispherical fairing each side at base of rudder; increased weapon/stores capability (four underwing stations), similar to that of F-7M; and new or additional avionics (which see). Joint development by Chengdu and Guizhou (GAIC); entered AFPLA service from 1992, but reportedly limited production and use only (15th and 19th Divisions).

J-7D (originally J-7 IIIA): Further (early 1990s) attempt to improve upon J-7 III; first flight August 1991; 71.6 kN (16,094 lb st) WP13F1 engine, JL-7A J-band interception radar, RWR antennas atop vertical fin; HK-13A HUD, Tacan and ADC; weapons upgrade to include PL-8 AAMs. Believed to equip two night fighter regiments of 15th and 29th Divisions, but production (1995-99) reportedly limited to 32 aircraft.



Unofficial photograph purporting to show CAC J-7G

0573878

J-7E: Upgraded version of J-7B with modified, double-delta wing, retaining existing leading-edge sweep angle of 57° inboard but reduced sweep of only 42° outboard; span increased by 1.17 m (3 ft 10 in) and area by 1.88 m² (20.2 sq ft), giving 8.17 per cent more wing area; four underwing stations instead of two, outer pair each plumbed for 480 litre (127 US gallon; 106 Imp gallon) drop tank; new WP7F version of WP7 engine, rated at 44.1 kN (9,921 lb st) dry and 63.7 kN (14,330 lb st) with afterburning; armament generally as listed for F-7M, but capability extended to include PL-8 (Python 3) air-to-air missiles; g limits of 8 (up to M0.8) and 6.5 (above M0.8); avionics include HUD and ADC. Believed to have made first flight in April 1990 and entered service 1993. Operators include 1st, 2nd, 3rd, 4th, 14th and 37th AFPLA Divisions and Navy 4th Division. Production reported to have ended in 2002, after 263 built, in favour of J-7G. PLA Navy version designated J-7EH.

J-7EB: Unarmed version of J-7E equipping AFPLA 'August 1st' aerobatic team (nine in 1998 display season); fitted with smoke canisters for display purposes. Replaced by J-7GB in 2005.

J-7FS: Technology demonstrator, modified from standard J-7 II, with new chin-mounted intake and central splitter plate under reconfigured ogival nosecone; more powerful (73.4 to 78.3 kN; 16,502 to 17,604 lb thrust class with afterburning) Liyang (LMC) WP13F II turbojet. Began 22 month flight test programme on 8 June 1998. Enlarged nose avionics bay able to accept 60 cm (23.6 in) diameter multimode pulse Doppler radar believed to be under development in China. Development work formed basis for new F-7MF export variant (which see). Planned future changes were to include wing modifications based on J-7E/F-7MG double-delta configuration.

J-7G: Further upgrade of J-7E; maiden flight June 2002. New KLJ-6E Falcon fire-control radar, PL-8 IR-guided AAMs and updated cockpit with new HUD and Type III IFF; intended for Chinese air force and naval units. Deliveries to AFPLA reportedly began in early 2003; further 16 in October 2004.

J-7GB: Unarmed J-7G for 'August 1st' display team, replacing J-7EB from 2005 season. Wraparound windscreen.

JJ-7: Tandem two-seat operational trainer, based on J-7 II and MiG-21US; developed at Guizhou by GAIC.

CURRENT VERSIONS (EXPORT): **F-7A**: Export counterpart of J-7 I/J-7A, supplied to Albania and Tanzania.

F-7B: Export version of J-7 II/J-7B, with R550 Magic missile capability; supplied to Egypt and Iraq in 1982-83 and also to Sudan. Some supplied to Air Force of Zimbabwe (known locally as F-7 II) appear to be of this version.

F-7BG: Designation of 12 F-7MGs ordered (plus four FT-7s, June 2005) by Bangladesh Air Force; to equip Nos. 5 and 35 Squadrons; first eight in service 4 April 2006.

F-7BS: Hybrid version supplied to Sri Lanka 1991; has F-7B fuselage/tail and Chinese avionics (no HUD), combined with four-pylon wings of F-7M. Equips No. 5 Squadron of SLAF. Zimbabwe also has some four-pylon aircraft with its No. 5 Squadron; these known locally as the F-7 HN.

F-7M Airguard: First upgraded export version, developed from J-7B; new avionics imported from May 1979 included Marconi HUDWAC (head-up display and weapon aiming computer); new ranging radar, air data computer, radar altimeter and IFF; more secure com radio; improved electrical power generation system for the new avionics; two additional underwing stores points; improved WP7B(BM) engine; birdproof windscreen; strengthened landing gear; ability to carry PL-7 air-to-air missiles; nose probe relocated from beneath intake to top lip of intake, offset to starboard. Exported to Iran and Myanmar. Description applies to F-7M version, except where indicated.

F-7MB: Variant of F-7M; mentioned in 1996 F-7MG brochure. Customer believed to be Bangladesh (16); one planned to be equipped with reconnaissance pod.



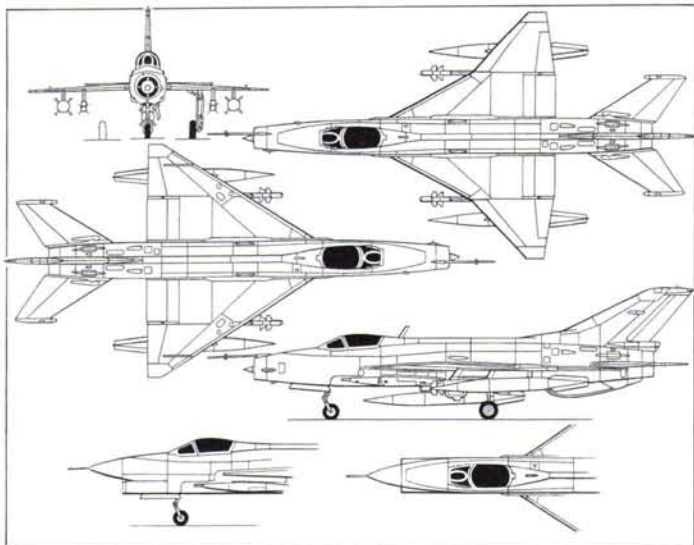
CAC J-7 single-seat fighter of PLA Navy's 8th Division

1153776



CAC J-7GBs of the 'August 1st' aerobatic team

1153775



CAC F-7M Airguard single-seat fighter and close support aircraft; upper plan view shows modified outer wings of J-7E and F-7MG; lower scrap views of J-7FS nose in profile and plan (Mike Keep)

0126688

F-7MF: Debut at Airshow China, November 2000; further development of J-7FS and F-7MG for export market. Larger 'solid' nose; shorter, rectangular intake located farther back under nose; small, shoulder-mounted canards just forward of wingroot leading-edge; WP13F engine; 1553B databus; avionics to include 43 n mile (80 km; 50 mile) range pulse Doppler radar (possibly Elta EL/M-2032), single HUD and dual HDDs; 3,000 kg (6,614 lb) external stores load.

Wind tunnel testing completed; first flight then targeted for late 2001/early 2002, but most recently forecast for second half of 2003, though not reported by March 2004. Performance expectations include M1.8 top speed, 16,000 m (52,500 ft) ceiling, 650 m (2,135 ft) T-O run and 1,403 n mile (2,600 km; 1,615 mile) ferry range. Possibly testbed for some features of J-10.

F-7MG: Improved version of F-7M (G suffix indicates *gai*: modified), combining double-delta wings of J-7E with Grifo MG radar, other upgraded avionics, uprated (WP13F) engine and leading/trailing-edge manoeuvring flaps. Said to have 45 per cent better manoeuvrability than F-7M. Public debut (aircraft 0142 and 0144) at Airshow China, Zhuhai, November 1996. Pakistan (see F-7PG) only customer until 2005, when 12 ordered by Bangladesh (see F-7BG); Zimbabwe said to be interested in enough for two squadrons.

F-7MP: Further modified variant of F-7P; improved cockpit layout and navigation system incorporating Rockwell Collins AN/ARN-147 VOR/ILS receiver, AN/ARN-149 ADF and Pro Line II digital DME-42. Avionics (contract for up to 100 sets) delivered to China from early 1989. FIAR (now Galileo) Grifo MG fire-control radar (range of more than 30 n miles; 55 km; 34 miles) for F-7P and MP ordered 1993, to replace Skyranger; flight trials began May 1996 and completed in 1997.

F-7N: Variant of F-7M; mentioned in 1996 F-7MG brochure, but no details given. Possibly an alternative designation for Zimbabwe F-7 IIN (see F-7BS paragraph above).

F-7NI: Version ordered by Nigerian Air Force (12) in 2005, together with three FT-7NI trainers.

F-7P Airguard: Variant of F-7M (briefly called Skybolt), embodying 24 modifications to meet specific requirements of Pakistan Air Force, including ability to carry four air-to-air missiles (Sidewinders) instead of two and fitment of Martin-Baker Mk 10L ejection seat. Delivered 1988-91. Equip No. 14 Squadron at Kamra-Minhas, Nos. 18 and 19 at Mianwali and No. 2 at Masroor.

F-7PG: Pakistan Air Force designation of F-7MG; 57 (plus six FT-7PGs) ordered in late 2000. Deliveries to Nos. 17 and 23 Squadrons at Samungli, replacing Shenyang F-6s, completed by second quarter 2002; third squadron is No. 20 at Rafiqui. Grifo 7PG radars (still awaiting firm contract) would be produced by KARF factory of Pakistan Aircraft Complex.

FT-7: Export designation of GAIC JJ-7 two-seat trainer.

CUSTOMERS: Several thousand built for Chinese air forces; Air Divisions currently equipped with J-7 variants comprise Nos. 1, 2, 3, 4, 9, 12, 14, 15, 18, 21, 24, 26, 29, 33, 35, 42 and 44, plus Naval 4th, each with two or three Regiments totalling up to 100 aircraft; Nos. 7, 17, 31 and 32 believed disbanded.

More than 400 exported to Albania (12 F-7A), Bangladesh (16 F-7MB and 12 F-7BG), Egypt (approximately 90 F-7B?), Iran (18 or more F-7M), Iraq (approximately 90 F-7B?), Myanmar (24 F-7M), Nigeria (12 F-7NI and three FT-7NI), Pakistan (20 F-7P and 100 F-7MP, all designated F-7P by PAF; followed by 57 F-7PG), Sri Lanka (four F-7BS), Sudan (22 F-7B); Tanzania (16 F-7A) and Zimbabwe (approximately 12 F-7B/F-7IIN variants).

DESIGN FEATURES: Typical mid-1950s design of fighter, incorporating diminutive delta wing (double-delta on J-7E/EB, J-7G/GB and F-7MG/PG), with clipped tips to mid-mounted wings, plus all-moving horizontal tail; circular-section fuselage with dorsal spine; nose intake with conical centrebody; swept tail, with large vertical surfaces and ventral fin.

Wing anhedral 2° from roots; incidence 0°; thickness/chord ratio approximately 5 per cent at root, 4.2 per cent at tip; quarter-chord sweepback 49° 6' 36" (reduced on J-7E/EB, J-7G/GB and F-7MG/PG outer panels); no wing leading-edge camber.

FLYING CONTROLS: Manual operation, with autostabilisation in pitch and roll; hydraulically boosted inset ailerons; plain trailing-edge flaps, actuated hydraulically; forward-hinged door-type airbrake each side of underfuselage below wing leading-edge; third, forward-hinged airbrake under fuselage forward of ventral fin; airbrakes actuated hydraulically; hydraulically boosted rudder and all-moving, trimmable tailplane. Leading/trailing-edge manoeuvring flaps on J-7E/EB, J-7G/GB and F-7MG/PG.

STRUCTURE: All-metal; wings have two primary spars and auxiliary spar; semi-monocoque fuselage, with spine housing control pushrods, avionics, single-point refuelling cap and fuel tank; blister fairings on fuselage above and below each wing to accommodate retracted mainwheels.

LANDING GEAR: Inward-retracting mainwheels, with 600x200 tyres (pressure 11.50 bar; 167 lb/sq in) and LS-16 disc brakes; forward-retracting nosewheel, with 500x180 tyre (pressure 7.00 bar; 102 lb/sq in) and LS-15 double-acting brake. Nosewheel steerable ±47°. Minimum ground turning radius 7.04 m (23 ft 1¼ in). Tail braking parachute at base of vertical tail.

POWER PLANT: *F-7M:* One LMC (Liyang) WP7B(BM) turbojet (43.2 kN; 9,700 lb st dry, 59.8 kN; 13,448 lb st with afterburning).

Total *F-7M* internal fuel capacity 2,385 litres (630 US gallons; 525 Imp gallons), contained in six flexible tanks in fuselage and two integral tanks in each wing. Provision for carrying a 500 or 800 litre (132 or 211 US gallon; 110 or 176 Imp gallon) centreline drop tank, and/or a 500 litre drop tank on each outboard underwing pylon. Maximum internal/external fuel capacity 4,185 litres (1,105 US gallons; 921 Imp gallons).

J-7C: LMC WP13 turbojet (40.2 kN; 9,039 lb st dry, 64.7 kN; 14,550 lb st with afterburning).

J-7E/EB: See Current Versions.

J-7FS: See Current Versions.

F-7MF/MG/PG: WP13F (44.1 kN; 9,921 lb st dry, 64.7 kN; 14,550 lb st with afterburning).

ACCOMMODATION: Pilot only, on CAC zero-height/low-speed ejection seat operable between 70 and 459 kt (130 and 850 km/h; 81 and 528 mph) IAS; or TY6 series zero/zero seat. Martin-Baker Mk 10L seat in *F-7P/MP/PG*. One-piece canopy, hinged at rear to open upward, *J-7C* canopy opens sideways to starboard.

SYSTEMS: Improved electrical system in *F-7M*, using three static inverters, to cater for additional avionics. Jianghuai YX-3 oxygen system.

AVIONICS: *Comms:* BAE Systems AD 3400 UHF/VHF multifunction com, Chinese Type 602 IFF transponder; Type 605A ('Odd Rods' type) IFF in *J-7C*.

Radar: BAE Systems Type 226 Skyranger ranging radar in *F-7M*; Chinese JL-7 fire-control radar in *J-7C*, JL-7A in *J-7D*; Galileo (formerly FIAR) Grifo MG in *F-7P/MP/MG/PG* (look-down, shoot-down and track-while-scan capability).

Flight: Navigation function of BAE Systems HUDWAC includes approach mode. WL-7 radio compass, XS-6A marker beacon receiver, Type 0101 HR A/2 radar altimeter and BAE Systems air data computer in *F-7M*.

Beijing Aeronautical Instruments Factory KJ-11 twin-channel autopilot and FJ-1 flight data recorder in *J-7C*.

J-7D has HK-13A HUD, JD-311 Tacan and Type 563B INS; JT-1 HUD, JD-3 Tacan in *J-7E*; GPS receiver added in *J-7E/GB*.

F-7MG/PG suite includes VOR/DME/INS and Tacan.

Instrumentation: BAE Systems Type 956 HUDWAC (head-up display and weapon aiming computer) in *F-7M* provides pilot with displays for instrument flying, with air-to-air and air-to-ground weapon aiming symbols integrated with flight-instrument symbology. It can store 32 weapon parameter functions, allowing for both current and future weapon variants. In air-to-air combat its four modes (missiles, conventional gunnery, snapshot gunnery, dogfight) and standby aiming reticle allow for all eventualities. Improved weapons management system in *J-7D*.

VCR and infra-red cockpit lighting in *F-7MG/PG*, for which licence-built Russian helmet sight, slaved to PL-9 AAM, is also in production.

Self-defence: Skyranger ECCM in *F-7M*. Chinese LJ-2 RWR and GT-4 ECM jammer in *J-7C*; BM/KJ 8602 RWR, RKL-800 ECM and RKZ-404E chaff/flare dispenser in *J-7D*.

ARMAMENT (F-7M): Two 30 mm Type 30-1 belt-fed cannon, with 60 rds/gun, in fairings under front fuselage just forward of wingroot leading-edges. Two hardpoints under each wing, of which outer ones are wet for carriage of drop tanks. Centreline pylon used for drop tank only. Each inboard pylon capable of carrying a PL-2, -2A, -5B, -7 or -8 (Python 3) missile (and PL-9 on *F-7MG/PG*) or, at customer's option, an R550 Magic; one 18-tube pod of Type 57-2 (57 mm) air-to-air and air-to-ground rockets; one Type 90-1 (90 mm) seven-tube pod of air-to-ground rockets; or a 50, 150, 250 or 500 kg bomb. Each outboard pylon can carry one of above rocket pods, a 50 or 150 kg bomb, or a 500 litre drop tank.

ARMAMENT (J-7C and later): One 23 mm Type 23-3 twin-barrel gun in ventral pack. Five external stores stations can carry up to four PL-2 or PL-5B air-launched missiles or two PL-8; two or four Qingan HF-16B 12-round launchers for Type 57-2 or seven-round pods of Type 90-1 rockets; or two 500 kg, four 250 kg or ten 100 kg bombs, in various combinations with 500 litre (one centreline and/or one under each wing) or 800 litre (underfuselage station only) drop tanks.

DIMENSIONS, EXTERNAL:

Wing span: except J-7E/F-7MG	7.15 m (23 ft 5½ in)
J-7E/F-7MG	8.32 m (27 ft 3½ in)
Wing chord: at root	5.51 m (18 ft 0¾ in)
at tip (except J-7E/F-7MG)	0.46 m (1 ft 6¼ in)
Wing aspect ratio: except J-7E/F-7MG	2.2
J-7E/F-7MG	2.8

Length overall: excl nose probe	13.945 m (45 ft 9 in)
incl nose probe	14.885 m (48 ft 10 in)
Fuselage: Length	12.175 m (39 ft 11½ in)
Max diameter	1.34 m (4 ft 4¾ in)
Height overall	4.105 m (13 ft 5½ in)
Tailplane span	3.74 m (12 ft 3¼ in)
Wheel track	2.69 m (8 ft 10 in)
Wheelbase	4.805 m (15 ft 9¼ in)

AREAS:

Wings, gross: except J-7E/F-7MG	23.00 m ² (247.6 sq ft)
J-7E/F-7MG	24.88 m ² (267.8 sq ft)
Ailerons (total): except J-7E/F-7MG	1.18 m ² (12.70 sq ft)
Trailing-edge flaps (total)	1.87 m ² (20.13 sq ft)
Fin	3.48 m ² (37.46 sq ft)
Rudder	0.97 m ² (10.44 sq ft)
Tailplane	3.94 m ² (42.41 sq ft)

WEIGHTS AND LOADINGS:

Weight empty: F-7M	5,275 kg (11,629 lb)
F-7MF	5,500 kg (12,125 lb)
F-7MG	5,292 kg (11,667 lb)
Normal T-O weight with two PL-2 or PL-7 air-to-air missiles:	
F-7M	7,531 kg (16,603 lb)
J-7C	8,150 kg (17,967 lb)
F-7MG	7,540 kg (16,623 lb)
Max T-O weight: F-7MG	9,100 kg (20,062 lb)
Wing loading at normal T-O weight:	
F-7M	327.4 kg/m ² (67.06 lb/sq ft)
J-7C	354.3 kg/m ² (72.56 lb/sq ft)
Max wing loading: F-7MG	365.8 kg/m ² (74.91 lb/sq ft)
Power loading at normal T-O weight:	
F-7M, J-7C	126 kg/kN (1.23 lb/lb st)
Max power loading: F-7MG	141 kg/kN (1.38 lb/lb st)

PERFORMANCE (F-7M at normal T-O weight with two PL-2 or PL-7 air-to-air missiles, except where indicated):

Never-exceed speed (VNE) above 12,500 m (41,010 ft)	M2.35 (1,346 kt; 2,495 km/h; 1,550 mph)
Max level speed between 12,500 and 18,500 m (41,010–60,700 ft)	M2.05 (1,175 kt; 2,175 km/h; 1,350 mph)
Unstick speed	167–178 kt (310–330 km/h; 193–205 mph)
Touchdown speed	162–173 kt (300–320 km/h; 186–199 mph)
Max rate of climb at S/L	10,800 m (35,435 ft)/min
Acceleration from M0.9 to M1.2 at 5,000 m (16,400 ft)	35 s
Max sustained turn rate: M0.7 at S/L	14.7°/s
M0.8 at 5,000 m (16,400 ft)	9.5°/s
Service ceiling	18,200 m (59,720 ft)
Absolute ceiling	18,700 m (61,360 ft)
T-O run	700–950 m (2,300–3,120 ft)
Landing run with brake-chute	600–900 m (1,970–2,955 ft)
Typical mission profiles:	
combat air patrol at 11,000 m (36,080 ft) with two air-to-air missiles and three 500 litre drop tanks, incl 5 min combat	45 min
long-range interception at 11,000 m (36,080 ft) at 351 n miles (650 km; 404 miles) from base, incl M1.5 dash and 5 min combat, stores as above	
hi-lo-hi interdiction radius, out and back at 11,000 m (36,080 ft), with three 500 litre drop tanks and two 150 kg bombs	324 n miles (600 km; 373 miles)
lo-lo-lo close air support radius with four rocket pods, no external tanks	200 n miles (370 km; 230 miles)

Range:

two PL-7 missiles and three 500 litre drop tanks ..	939 n miles (1,740 km; 1,081 miles)
self-ferry with one 800 litre and two 500 litre drop tanks, no missiles	1,203 n miles (2,230 km; 1,385 miles)
g limit	+8

PERFORMANCE (J-7C at normal T-O weight):

Max operating Mach No. (MMO)	2.1
Unstick speed with afterburning	173 kt (320 km/h; 199 mph)
Touchdown speed with flap blowing	146 kt (270 km/h; 168 mph)
Min level flight speed	140 kt (260 km/h; 162 mph)
Max rate of climb at S/L	9,000 m (29,525 ft)/min
Service ceiling	18,000 m (59,060 ft)
Acceleration from M1.2 to M1.9 at 13,000 m (42,660 ft)	3 min 27 s
Air turning radius at 5,000 m (16,400 ft) at M1.2	5.093 m (16,710 ft)
T-O run with afterburning	800 m (2,625 ft)
Landing run with flap blowing, drag-chute and brakes deployed	550 m (1,805 ft)
Range: on internal fuel	518 n miles (960 km; 596 miles)
with 800 litre belly tank	701 n miles (1,300 km; 807 miles)
with 800 litre belly tank and two 500 litre underwing tanks	1,025 n miles (1,900 km; 1,180 miles)
g limits: up to M0.8	+8.5
above M0.8	+7

PERFORMANCE (F-7MG):

Max operating Mach No. (MMO)	2.0
Max level speed	648 kt (1,200 km/h; 745 mph) IAS
Min level speed	114 kt (210 km/h; 131 mph) IAS
Max rate of climb at S/L	11,700 m (38,386 ft)/min
Max instantaneous turn rate	25.2°/s
Sustained turn rate: at 1,000 m (3,280 ft)	16°/s
at 5,000 m (16,400 ft)	11°/s
at 8,000 m (26,240 ft)	8°/s
Service ceiling	17,500 m (57,420 ft)
Theoretical ceiling	18,000 m (59,060 ft)
T-O run, with afterburning, and landing run	600–700 m (1,970–2,300 ft)

Operational radius:

air superiority (hi-hi-hi) with two AIM-9P AAMs and three 500 litre drop tanks, incl 5 min combat with afterburner	459 n miles (850 km; 528 miles)
air-to-ground attack (lo-lo-hi) with two Mk 82 bombs and two 500 litre drop tanks	297 n miles (550 km; 342 miles)
Ferry range	1,187 n miles (2,200 km; 1,367 miles)
g limits	+8/-3

CAC FC-1 XIAOLONG

English name: Thunder Dragon

Pakistan Air Force designation: JF-17 Thunder

TYPE: Attack fighter.

PROGRAMME: Fighter China (FC) programme launched 1991 following cancellation of US participation in development of Chengdu Super-7. Some design assistance from MiG OKB, possibly based on (then-designated MiG-33) mid-1980s project for single-engined variant of the MiG-29. (Sources at MiG experimental bureau quoted as saying that FC-1 was designed there to a military specification as 1zd (*Izdeliye*: article) 33 and later offered for Chinese production following cancellation of Russian requirement.) Collaboration with Pakistan began with 1995 MoU, leading to joint development and production contract in June 1999, but avionics selection for Pakistan bedevilled by sanctions and technology transfer concerns, and this aspect separated from airframe development progress in early 2001.

Full-scale mockup completed 2001 and exhibited at Zhuhai November 2002. First five prototypes (including 02 for static and 05 for fatigue test, and 04 earmarked as avionics and weapon systems testbed) under construction by then, with oft-postponed maiden flight targeted for mid-2003. First batch of RD-93 engines, to power 01, 03 and 04, received in 2002. Formal approval for production, at CAC's No. 132 factory, reported in January 2003. Pakistan renamed Super-7 as JF-17 (Joint Fighter) Thunder in 2003.

First FC-1 rolled out 31 May 2003 and began low-speed taxiing trials 27 June, followed by eight-minute maiden flight (first of two that day) on 25 August, and first 'official' flight, by then also bearing JF-17 markings, 3 September 2003, all at Chengdu's Wenjiang Airport. Pakistan news reports at that time indicated following timetable (not achieved) for that country's participation: finalise MoU September 2003; sign contract December 2003; low-rate initial production by Pakistan Aeronautical Complex from June 2004 to December 2005; begin full rate production January 2006.

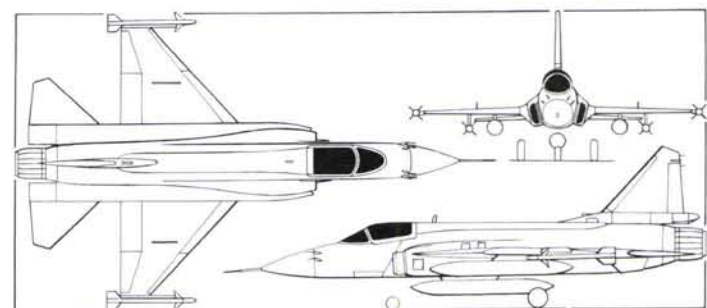
Maiden flight of second flight test prototype (03, also known as PT3) occurred on 9 April 2004. Pakistan Air Force test pilots flew PT1 first prototype for first time two days earlier. By end of 2004, cumulative total of more than 300 hours had been flown. Contract to supply 100 RD-93 engines, manufactured by Klimov (30) and Chernyshev Machine Building Enterprise (70) and reportedly valued at USD267 million, announced April 2005; option to purchase up to 500 more. At first, these prohibited from use in JF-17 version, but this decision revoked in November 2006. Two competing Chinese radars being tested during 2005. Pakistan production formally launched at PAC Kamra on 6 April 2005. Modifications introduced on third flying prototype (04, aka PT4) include enlarged engine air intake, wingroot strakes extended, taller tailfin topped by (RWR ?) fairing; flight testing began 28 April 2006 as avionics and weapon systems integration prototype; two further prototypes to this configuration; two additional aircraft to be completed in 2006.

CUSTOMERS: Envisaged for air forces of China and Pakistan initially, but costed to be competitive in wider export market. Promoted to Bangladesh, Egypt and Nigeria in 2003;



CAC FC-1 PT4 showing enlarged LERX

1040444



CAC FC-1 attack fighter (James Goulding)

1121595

For details of the latest updates to *Jane's All the World's Aircraft* online and to discover the additional information available exclusively to online subscribers please visit jawa.janes.com



PT4/04, third flying FC-1 prototype, lands after a 2006 test flight

1040443



Third flying CAC FC-1 '04'

1040445

mid-2004 reports of Zimbabwean order for 12 proved to be erroneous. Seen as potential replacement for Shenyang J-6, Chengdu J-7, Nanchang Q-5, Northrop F-5 and Dassault Mirage III/5. Chinese domestic requirement for the FC-1 (AFPLA and possibly PLA Navy) is said to be for several hundred aircraft; Pakistan requirement is initially for 150, including a two-seat tactical/trainer version.

Preproduction batch of 16 to be built (eight for each partner country), of which CAC and PAC will each assemble four of those for each customer; first eight deliveries (from CAC) scheduled for mid-2007, and second eight (by PAC) by end of 2007. Hand-over of first two (Chinese-built) JF-17s to Pakistan Air Force scheduled for 10 March 2007, in time for military parade on 23 March.

COSTS: Development investment of some USD150 million by mid-2001.

DESIGN FEATURES: Agile light fighter. Mid-mounted delta wing with 42° sweepback and narrow wingroot strakes at leading-edge; leading-edge manoeuvring flaps; single turbofan engine; side-mounted twin intakes, with splitter plates; large intake trunks provide space for considerable internal fuel capacity. Large main fin with dorsal fairing; two smaller, uncanted ventral fins.

FLYING CONTROLS: Conventional hydraulic servo-operated control of ailerons, rudder and all-moving tailplane initially, with single analogue fly-by-wire system for back-up; provision for FBW to become primary system later. Trailing-edge and leading-edge flaps.

STRUCTURE: Primary structure conventional aluminium and steel alloy semi-monocoque. Some components may be manufactured in Pakistan.

LANDING GEAR: Retractable tricycle type, with single wheel and oleo shock-absorber on each unit. Mainwheels retract upward into engine intake trunks; nosewheel retracts rearward.

POWER PLANT: One Klimov RD-93 (RD-33 derivative) turbofan (81.4 kN; 18,298 lb st with afterburning). Substantial internal fuel capacity (see Weights and Loadings below). Provision for external fuel tanks. Pakistan Air Force plans eventual installation of in-flight refuelling probe.

ACCOMMODATION: Single Jiangnan TY6 zero/zero ejection seat under one-piece canopy. Two-seat, combat-capable training version also planned.

AVIONICS: Chinese avionics in prototypes include ring laser gyro INS/GPS, IR search and track system, HUD and NVG-capable instruments. Pakistan aircraft to have Chinese (J-10 standard) avionics, following inconclusive evaluation of bids from BAE Systems, SAGEM and Thales; all avionics interfaced with 1553-standard, PC-based mission computer.

Radar: Prototype 01 and 03 variously reported as having Chinese NRIET KLJ-10 and/or Israeli Elta EL/M-2032 pulse Doppler fire control radar; 05 planned to evaluate KLJ-10 versus Aviation Radar and Electrical Equipment Institute (AREEI; ex-LETRI) SY-80 competitor during 2005. Pakistan reported in late 2004 to have abandoned its original choice of Galileo Grifo S-7 and agreed to accept Chinese radar in first batch of aircraft.

ARMAMENT: Underfuselage centreline station for 23 mm GSh-23-2 twin-barrel cannon or other store; two attachments under each wing and one at each wingtip. Weapons can include advanced AAMs, ASMs, anti-runway and laser-guided bombs, gun and rocket pods, or other stores. Mockup seen in November 2002 mounting the AMRAAM-class No. 607 Institute SD-10 (PL-12) BVR, active radar homing AAM (lock-on range 20 km; 12.4 miles).

DIMENSIONS, EXTERNAL:

Wing span, to c/l of AAMs	9.50 m (31 ft 2 in)
Wing aspect ratio	3.7
Length overall	14.70 m (48 ft 2 3/4 in)

Height overall	4.80 m (15 ft 9 in)
Wheel track	2.30 m (7 ft 6 1/2 in)
Wheelbase	5.14 m (16 ft 10 1/4 in)
AREAS:	
Wings, gross	24.40 m ² (262.6 sq ft)
WEIGHTS AND LOADINGS:	
Weight empty	6,450 kg (14,220 lb)
Max external stores load	3,600 kg (7,937 lb)
Max internal fuel weight	2,300 kg (5,071 lb)
T-O weight:	
normal (wingtip AAMs only)	9,100 kg (20,062 lb)
max	12,400 kg (27,337 lb)
Max wing loading	520.5 kg/m ² (106.61 lb/sq ft)
Max power loading	156 kg/kN (1.53 lb/lb st)
PERFORMANCE (estimated):	
Max level speed at altitude, clean	M1.8
Service ceiling	16,000 m (52,495 ft)
T-O run	450 m (1,480 ft)
Landing run	750 m (2,460 ft)
Combat radius:	
fighter	648 n miles (1,200 km; 745 miles)
ground attack	378 n miles (700 km; 435 miles)
Max range on internal fuel	971 n miles (1,800 km; 1,118 miles)
Ferry range	1,619 n miles (3,000 km; 1,864 miles)
g limit	+8

CAC J-10

English name: Vigorous Dragon

Chinese name: Jianji-10 (Fighter aircraft 10)

Westernised designation: F-10

TYPE: Multirole fighter.

PROGRAMME: Reports of the existence of this new Chinese fighter began to emerge in October 1994, following the detection by a US intelligence satellite of a prototype at Chengdu. In the weight and performance class of the Eurofighter Typhoon and Dassault Rafale, the J-10 bears a close external resemblance to the cancelled IAI Lavi of the late 1980s, despite Israeli government statements that fears of unauthorised technology transfer are unfounded. A photograph, released in 1996 by the People's Liberation Army, of a wind tunnel model of the J-10 showed it to be outwardly identical to the Lavi in all essential respects, apart from slightly raised foreplanes and the addition of wingroot trailing-edge extensions.

This was confirmed in January 2001 when an unauthorised source posted a photograph of prototype 1001 on the Worldwide Web (although it was rapidly removed). The photograph showed the artist's impression first published in the 1997-98 *Jane's All the World's Aircraft* to be accurate in all respects, except that it was larger, and fin chord was some 20 per cent greater from root to tip.

It now appears that go-ahead for what became the J-10 was given in September 1988, development by No. 611 Research Institute beginning in the following month. An all-metal



CAC J-10 apparently in AFPLA service

1153771



Line-up of 44th Air Division CAC J-10s at Mengzi

1040449

mockup was completed by late 1993, but poor performance predictions, coupled with a requirement change from air superiority to multirole, caused some redesign and consequent delays in the programme.

In late 1995, Russian sources indicated that the first flight, then expected during the early part of 1996, would be powered by a single AL-31FN turbofan; first prototype 1001 is said to have achieved this milestone in mid-1996. Russian avionics manufacturer Phazotron offered its Zhuk (Beetle) radar (already selected for the F-8 IIM upgrade programme) and the more capable Zhemchug (Pearls) and RP-35 as alternatives to the Elta EL/M-2035 or a derivative.

In late 1997, the slightly modified prototype 1002 was lost in a fatal accident. Two further prototypes (1003 and 1004) had been completed, and designation J-10 bestowed, during that year; the officially announced 'first' flight date of 23 March 1998 apparently referred to resumption of flight testing by one of these aircraft. According to China-based sources, 10 AL-31FN engines had been imported by end 1997 and four J-10 prototypes completed. An unofficial CAC source in mid-1999 stated that two prototypes (evidently 1001 and 1003) were then flying, with four others undergoing static test, still being assembled or only just completed; of these, 1004 and/or 1005 may have been static/fatigue test aircraft. Chinese sources at Zhuhai in November 2000 stated that between five and eight J-10s then built and more than 140 test flights made; nine aircraft identified by mid-2002, of which 1007 to 1009 may be further prototypes or preproduction aircraft, one having made a 'first' flight on 28 June 2002. Meanwhile, unconfirmed reports in late 2002/early 2003 indicated that 10 J-10s had been deployed with the Nanjing Military Region in August 2002 for operational evaluation or familiarisation training; and that manufacture of the first two two-seat examples would begin in 2003 and would have enhanced air-to-ground and maritime attack capability. Maiden flight of two-seater reported as occurring on 26 December 2003, with photographs appearing on Internet at that time. First (preproduction or serial production) J-10As delivered to AFPLA training unit on 23 February 2003, according to Chinese Xinhua news agency. Serial numbers 1015 and 1016 seen during that year.

The J-10 failed to make its widely predicted public debut at Zhuhai in November 2002, but it emerged shortly after the show that CAC and the No. 611 Institute had completed conceptual design work on two advanced variants of the J-10: one single- and one twin-engined, both having twin vertical tailfins and embodying stealth characteristics. Both also featured a redesigned and more angular nose section. It has also been noted that in 2002 the *China People's Daily* referred to the J-10 as *Qiang Shi* (Attack 10), rather than the *Jian* (Fighter) title that might have been expected. This appears to support the belief that the aircraft is viewed as a J-7/Q-5 replacement rather than a rival to the Su-27/J-11 to replace the Shenyang J-8. In September 2004, the C-in-C of the Pakistan Air Force indicated that

test pilots would be sent to China 'soon' to fly the J-10. First official acknowledgement that J-10 was in operational service with AFPLA was made on state television news 29 December 2006.

CURRENT VERSIONS: **J-10A:** Single-seat fighter.

J-10S: Two-seat conversion/continuation trainer and potential attack or 'Wild Weasel' ECM aircraft. First flight 26 December 2003. Observed serials 1021 and 1023 believed to identify prototypes 01 and 03; others seen subsequently include 1106 and 1108. Deep dorsal spine housing avionics displaced by second cockpit.

J-10B: Advanced version, reported in early 2006 to have more powerful (AL-31FN M1) engine, thrust-vector control, strengthened airframe and passive phased-array radar. Known serials include 10541 and 50756, latter indicating 76th production aircraft.

CUSTOMERS: Reports have suggested an AFPLA requirement for up to 300. Identified in use by 3rd Test Flight Regiment in 2004, unit being based at CAC's factory airfield, Wenjiang, Chengdu. By 2005, 44th Air Division at Mengzi, Yunnan, reportedly operating 32 J-10s. Now also with 3rd Air Division. On 12 April 2006, Pakistan government authorised Pakistan Air Force to begin negotiations for purchase of a quantity (reportedly, up to 36) of J-10s as part of its fighter force expansion plans.

DESIGN FEATURES: Tail-less delta wing and close-coupled foreplanes; single sweptback vertical tail with twin outward-canted ventral fins; single, rectangular ventral engine air intake.

FLYING CONTROLS: All-moving foreplanes; inboard and outboard elevons; single-piece rudder; wing leading-edge manoeuvring flaps.

LANDING GEAR: Retractable tricycle type. Main units retract forwards, twin-wheel nose unit rearwards.

POWER PLANT: One Saturn/Lyulka AL-31FN turbofan (79.4 kN; 17,857 lb st dry and 122.6 kN; 27,558 lb st with afterburning) in prototypes and initial production aircraft; total 54 engines delivered by MMPP Salyut 2001–2003, according to Moscow-based Jane's source; contract completed in January 2004. Non-approval of manufacturing licence for this engine indicated possibility of change to domestic (WS10A?) power plant in later aircraft, or upgrade to more powerful AL-31-117C. However, in December 2005 Salyut revealed USD300 million order for 100 132.4 kN (29,762 lb st) AL-31FN M1 versions of AL-31, said to have been purposely developed for 'Super-10' and having FADEC and four-way swivelling exhaust nozzle.

Fuel capacity reported to be in region of 3,175 litres (839 US gallons; 698.5 Imp gallons) in wings and 1,775 litres (469 US gallons; 390.5 Imp gallons in fuselage), giving total internal capacity of 4,950 litres (1,308 US gallons; 1,089 Imp gallons). Provision for auxiliary fuel tanks on centreline and inboard underwing stations.



CAC J-10S two-seat trainer

1040450



CAC J-10 at an official presentation

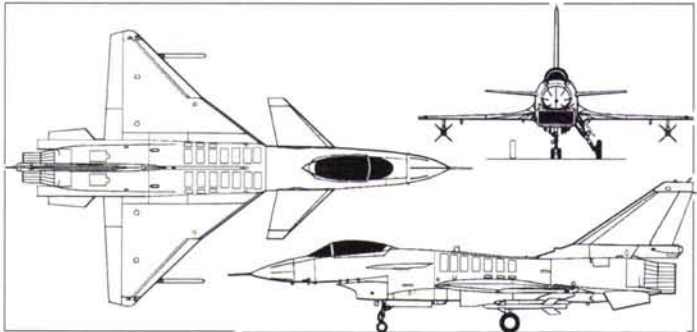
1153770



Video-grab of 2004 purporting to show J-10 cockpit

1121633

ACCOMMODATION: Pilot only, on zero/zero ejection seat (apparently Martin-Baker in prototypes; possibly domestic Jiangnan TY6 planned later).
AVIONICS: Reportedly equipped with Type 634 quadruplex digital fly-by-wire FCS, GPS/INS navigation, HOTAS controls, a wide field of view HUD, one colour and two monochrome liquid crystal MFDs (weapons, RWR/navigation and radar information), air data computer, 1553B-standard databus and a helmet-mounted weapon sight, FCS based on active control technology developed in F-8 II ACT testbed, Pulse Doppler radar apparently yet to be selected; quoted candidates include Phazotron Zhuk or Zhemchug, domestic (LETRI



Provisional general arrangement of J-10 fighter (Paul Jackson)

1151999

JL-10A, Elta EL/M-2035 and FIAR Grifo 2000. Prototypes and initial production J-10As reported to have domestic Type 1473 radar.
In early 2006, *Jane's* sources reported that China had received three Zhemchug units, with no further examples ordered; and was then working with an alternative Russian manufacturer, Tikhomirov NIIP, which had supplied one or more derivatives of its Pero passive phased-array radar for consideration.
ARMAMENT: Released photographs indicate 11 external stores points, including one on centreline, tandem pairs on fuselage sides and three under each wing, the outboard wing stations each carrying PL-8 (Python 3) or later AAMs such as PL-11 or PL-12. Other potential weapons could include Vympel R-73 and R-77 AAMs; C-801 or C-802 ASM; YJ-8K (anti-ship) or YJ-9 (anti-radiation) missiles; and laser-guided or free-fall bombs. Internally mounted 23 mm cannon on port side of nosewheel; provision for a Chinese-developed (Luoyang Filat?) IR/laser navigation and targeting pod.
Following estimated data have not been confirmed.
DIMENSIONS, EXTERNAL:
Wing span 8.78 m (28 ft 9¾ in)
Length overall 14.57 m (47 ft 9½ in)
Height overall 4.78 m (15 ft 8¼ in)
AREAS:
Wings, gross 33.1 m² (356.3 sq ft)
Foreplanes (total) 5.45 m² (58.66 sq ft)
WEIGHTS AND LOADINGS:
Weight empty 9,750 kg (21,495 lb)
Max internal fuel 4,500 kg (9,921 lb)
Max external stores load 4,500 kg (9,921 lb)
Max T-O weight with external stores 18,500 kg (40,785 lb)
PERFORMANCE:
Max level speed: at altitude M1.85
at S/L M1.2
Service ceiling 18,000 m (59,050 ft)
T-O run, clean 350 m (1,150 ft)
Combat radius 250–300 n miles (463–555 km; 287–345 miles)
Ferry range with max internal and external fuel 1,000 n miles (1,850 km; 1,150 miles)
g limits +9/–3

CHAIG

CHANGHE AIRCRAFT INDUSTRIES GROUP
(CHANGHE FEIJI GONGYE GONGSI)
(SUBSIDIARY OF AVIC II)

PO Box 109, Jingdezhen, Jiangxi 333002
Tel: (+86 798) 846 22 53 and 846 25 88
Fax: (+86 798) 846 65 80
e-mail: chiehgs@changha.com
Web: www.changhe.com
PRESIDENT: Wang Bin

CHAIG (formerly Changhe Aircraft Factory), which occupies a 484 ha (1,196 acre) site at Jingdezhen, was formed in 1969 and is now one of the 500 largest industries in China, with assets of 6.9 billion yuan. It had a 2004 workforce of more than 11,000 and began producing coaches, minivans, cars and other commercial road vehicles in 1974. These and other automotive products still account for most of output, but batch-produced helicopters include the Z-8 and Z-11.

CHAIG is responsible for manufacture of the tailcone, vertical fin and horizontal stabiliser of the Sikorsky S-92 helicopter. The tail for the first S-92 was delivered to Sikorsky in May 1997. Changhe has also become the centre for Chinese licensed assembly and parts

manufacture of the AgustaWestland A 109E Power, as the result of an agreement signed in November 2004. Under this, a new joint venture company known as Jiangxi Changhe Helicopter Company, owned 60 per cent by CHAIG and 40 per cent by AgustaWestland, is responsible for all A 109 sales activities in China, where it is known as the CA 109. In November 2006, Sikorsky announced an MoU with AVIC II under which Jiangxi Changhe Helicopter Co will also manufacture airframe assemblies for the Schweizer 300 CBi light helicopter.

CHAIG Z-8

Chinese name: Zhishengji-8 (Vertical take-off aircraft 8)

TYPE: Naval combat helicopter.

PROGRAMME: Design work begun 1976, but suspended from 1979 to mid-1984; initial flight of first prototype 11 December 1985, second prototype October 1987; domestic type approval awarded 8 April 1989; first Z-8 handed over to PLA Naval Aviation for service trials 5 August 1989; initial production approved; final design approval granted 12 November 1994. Applications include troop transport, ASW/ASV, search and rescue, minelaying/sweeping, aerial survey and firefighting. Small-scale production apparently continues.



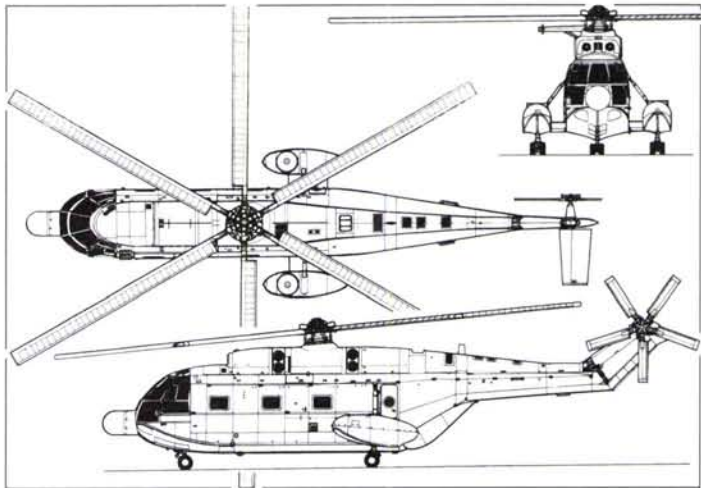
Changhe Z-8 fitted with rescue hoist

1153757



CHAIG Z-8A army transport helicopter

1153759



Changhe Z-8 (three WZ6 turboshafts) (Paul Jackson)

1152000

CURRENT VERSIONS: **Z-8:** Standard version, *as described*.
Z-8A: Designation of upgraded tactical transport version, with Turbomeca Makila 2A engines matched to Turmo gearbox. Two reportedly delivered to PLA Army Aviation for evaluation in 2001; camouflaged; seen with and without nose radome and side-mounted floats. Reports indicate that production deliveries began in November 2002, with about seven in service by late 2003.
Z-8F: Improved and more powerful version, for which the 1,380 kW (1,850 shp) P&WC PT6B-67A turboshaft was selected in November 2002. First flight expected in second quarter 2004, but postponed when engines returned to Canada for modification. Engines returned and reinstalled mid-2004; maiden flight reported to have taken place on 28 August 2004; certification, as 30-passenger civil transport, targeted for 2007. Additional 671 kW (900 shp) of power expected to enhance 'hot-and-high' performance, including increase in service ceiling to 4,700 m (15,420 ft) at MTOW and increased payload capacity. Other improvements said to include new (composites) main rotor blades, with anti-icing; new avionics and mission equipment. Duties envisaged are search and rescue, general utility missions and logistics support.

CUSTOMERS: Up to 20 standard Z-8s delivered to PLA Navy by end of 1999; upgraded versions still being promoted by CATIC in 2004. Sole operating naval unit is Shipborne Helicopter Group within East Sea Fleet at Dachang (Shanghai). Z-8s have serial numbers in range 9007 to 9097 and 9107 to 9197, while Super Frelons serialised in ranges 9406 to 9496 and 9506 to 9596. Army Z-8As numbered in LH-97800 range.

DESIGN FEATURES: Chinese equivalent of Aerospatiale Super Frelon, of which 16 supplied to PLA Navy in 1977-78. Six-blade main rotor and five-blade tail rotor; boat-hull fuselage with watertight compartments inside planing bottom; stabilising float at rear each side, attached to small stub-wing; small, strut-braced fixed horizontal stabiliser on starboard side of tail rotor pylon. Search radar in nose 'thimble' on SAR version.

FLYING CONTROLS: Pitch control fitting at root of each main rotor blade; drag and flapping hinges for each blade mounted on rotor head starplates; each main blade also has a hydraulic drag damper. Fully redundant flight control system, with Dong Fang KJ-8 autopilot.

STRUCTURE: Stressed skin metal fuselage, with riveted watertight compartments; gearboxes manufactured by Zhongnan Transmission Machinery Factory, CCXLI.

LANDING GEAR: Non-retractable tricycle type, with twin wheels and low-pressure oleo-pneumatic shock-absorber on each unit. Small tripod tailskid under rear of tailboom. Boat hull and side floats permit emergency water landings and take-offs.

POWER PLANT: Three Changzhou (CLXMW) WZ6 turboshafts, each with maximum emergency rating of 1,156 kW (1,550 shp) and 20 per cent power reserve at S/L, ISA. Two engines side by side in front of main rotor shaft and one aft of shaft. Transmission rated at 3,072 kW (4,120 shp).
Standard internal fuel capacity 3,900 litres (1,030 US gallons; 858 Imp gallons), in flexible tanks under floor of centre-fuselage. Auxiliary fuel tanks can be carried inside cabin for extended-range or self-ferry missions, increasing total capacity to 5,800 litres (1,532 US gallons; 1,276 Imp gallons).

ACCOMMODATION: Crew of two or three on flight deck. Accommodation in main cabin for up to 27 fully armed troops, or 39 without equipment; up to 15 stretchers and a medical attendant in ambulance configuration; a BJ-212 Jeep-type vehicle and its crew; or other configurations according to mission. Entire accommodation heated, ventilated, soundproofed and vibration-proofed. Forward-opening crew door on each side of flight deck. Rearward-sliding door at front of cabin on starboard side. Hydraulically actuated rear-loading ramp/door.

EQUIPMENT: Equipment for SAR role can include 275 kg (606 lb) capacity hydraulic rescue hoist and two five-person liferafts. Can also be equipped with sonar, sonobuoys, search radar, or equipment for oceanography, geological survey and forest firefighting.

ARMAMENT: Can be equipped with Yu-7 torpedoes, anti-shipping missiles, or gear for minelaying (eight 250 kg mines) or minesweeping.

DIMENSIONS, EXTERNAL:

Main rotor diameter	18.90 m (62 ft 0 in)
Tail rotor diameter	4.00 m (13 ft 1½ in)
Length overall, rotors turning	23.035 m (75 ft 7 in)
Height overall, rotors turning	6.66 m (21 ft 10¼ in)
Width over main gear sponsons	5.20 m (17 ft 0¾ in)

AREAS:

Main rotor blades (each)	5.10 m² (54.90 sq ft)
Tail rotor blades (each)	0.56 m² (6.03 sq ft)
Main rotor disc	280.48 m² (3,019.1 sq ft)
Tail rotor disc	12.57 m² (135.3 sq ft)

WEIGHTS AND LOADINGS:

Manufacturer's weight empty	6,980 kg (15,388 lb)
Weight empty, equipped	7,550 kg (16,645 lb)
Max cargo payload: internal	4,000 kg (8,818 lb)
on external sling	5,000 kg (11,023 lb)
Max T-O weight: standard fuel	10,592 kg (23,351 lb)
with auxiliary fuel	13,000 kg (28,660 lb)
Max disc loading:	
standard fuel	37.8 kg/m² (7.73 lb/sq ft)
auxiliary fuel	46.35 kg/m² (9.49 lb/sq ft)
Transmission loading at max T-O weight and power:	
standard fuel	3.45 kg/kW (5.67 lb/shp)
auxiliary fuel	4.23 kg/kW (6.96 lb/shp)



Makila-engined Z-8A of the Chinese PLA 1153758

PERFORMANCE (A: at T-O weight of 9,000 kg; 19,841 lb. B: at 11,000 kg; 24,251 lb. C: at 13,000 kg; 28,660 lb):

Never-exceed speed (VNE):	
A	170 kt (315 km/h; 195 mph)
B	159 kt (296 km/h; 183 mph)
C	148 kt (275 km/h; 170 mph)
Max cruising speed: A	143 kt (266 km/h; 165 mph)
B	140 kt (260 km/h; 161 mph)
C	134 kt (248 km/h; 154 mph)
Econ cruising speed: A	137 kt (255 km/h; 158 mph)
B	132 kt (246 km/h; 153 mph)
C	125 kt (232 km/h; 144 mph)
Rate of climb at S/L (15° 30' collective pitch, OEI):	
A	690 m (2,263 ft)/min
B	552 m (1,811 ft)/min
C	396 m (1,299 ft)/min
Service ceiling: A	6,000 m (19,680 ft)
B	4,900 m (16,080 ft)
C	3,050 m (10,000 ft)
Hovering ceiling IGE: A	5,500 m (18,040 ft)
B	3,600 m (11,800 ft)
C	1,900 m (6,240 ft)
Hovering ceiling OGE: A	4,400 m (14,440 ft)
B	2,300 m (7,540 ft)
Range with max standard or auxiliary fuel, OEI, no reserves: A	232 n miles (430 km; 267 miles)
B	442 n miles (820 km; 509 miles)
C	431 n miles (800 km; 497 miles)
Ferry range with auxiliary fuel tanks, OEI, no reserves: C	755 n miles (1,400 km; 870 miles)
Endurance with max standard or auxiliary fuel, OEI, no reserves: A	2 h 31 min
B	4 h 43 min
C	4 h 10 min

CHAIG Z-11

Chinese name: Zhishengji-11 (Vertical take-off aircraft 11)

TYPE: Light utility helicopter.

PROGRAMME: First details officially released at China Air Show in Zhuhai November 1996, together with photographs showing one or two Z-11s in flight. Development by Chinese Helicopter R&D Institute (CHRDl) began in 1991; quoted first flight date of 22 December 1994 thought to refer to re-engined modification of two second-hand ex-US ASars (Ecureuils) acquired earlier that year. In early 1997, a Chinese government agency announced that the Z-11 had flown for the first time on 26 December 1996.

The Z-11 appears identical externally to Eurocopter AS 350B Ecureuil except for nose contours, but CHAIG publicity in mid-2001 stated that "China owns its independent intellectual property rights". Eurocopter (which sold eight Ecureuils to China in 1996)

declines to comment on its provenance. Project reportedly launched in 1989, with development work beginning in 1992. Technical appraisal was completed in 1996, and small batch production began in 1997, first customer deliveries being made in September 1998. Test programme included flights totalling 719 n miles (1,332 km; 827 miles) in temperatures from -43 to +6°C (-41.7 to 42.8°F), including a 2-hour sortie cruising at -38°C (-38.9°F). Design was finalised in December 2000, and the Z-11 received CAAC certification in April 2001, CAAC approval for series production for civilian use was announced on 23 December 2002.

A twin-engined version was planned, for which the Rolls-Royce 250 and Turbomeca Arrius 1A were in contention in 2002-03, but no further news of this had emerged by early 2006.

CURRENT VERSIONS: **Civil:** Applications include public security; powerline inspection and maintenance; geological survey; forest fire protection; emergency medical service; aerial seeding and crop-spraying; touring and sightseeing.

Military: Quoted roles include reconnaissance; control and communications; frontier patrol; law enforcement; executive transport; and crew training.

Z-11J: Public security version, reported by Xinhua news agency in mid-November 2005, following 'recent' maiden flight. Two to six seats, searchlight(s), electric winch and other mission equipment. Roles include patrol, emergency rescue and disaster relief.

Z-11MB1: Made its first flight on 7 March 2003 powered by a 632 kW (848 shp) Turbomeca Arriel 2B1A turboshaft. Changhe hoped to receive certification of this version by the end of 2003, but not reported by end of following year.

Z-11W: Reported designation of armed version, equipped with cannon, ATMs, unguided rockets and a roof-mounted low-light/infra-red sight, first flown 27 December 2004.

CUSTOMERS: Eight said to have been completed by late 1996, of which four had been delivered. All photographs released before late 1998 showed Z-11 in military camouflage with PLA insignia. One report from Aviation Expo China in October 1997 stated that the PLA had ordered 20 military Z-11s, these apparently going to Army Aviation's training school and 4th Army Aviation Regiment. Production amounted to 'several dozen' by mid-2001, at which time some 10,000 hours flown and 50,000 take-offs and landings. According to one estimate, about 59, including some armed examples, were in PLA Army Aviation service by late 2003.

Chongqing Three Gorges General Aviation Airlines (one ordered) reported as first civil customer in mid-2001; China Central Television of Jiangxi Province received one on 25 August 2002. One Z-11MB1 reportedly sold and delivered to (unidentified) Chinese customer by September 2003.

POWER PLANT: One 510 kW (684 shp) WZ8D turboshaft (licence-built Turbomeca Arriel 1D), reportedly produced by Liming engine factory.

EQUIPMENT: Breeze-Eastern HS-29700 electric rescue hoist optional.

DIMENSIONS, EXTERNAL:

Main rotor diameter	10.69 m (35 ft 0¾ in)
Tail rotor diameter	1.86 m (6 ft 1¼ in)
Length overall, main rotor turning	13.01 m (42 ft 8¼ in)
Fuselage: Length	11.24 m (36 ft 10½ in)
Max width	1.80 m (5 ft 10¾ in)
Height: over tailfin	3.02 m (9 ft 11 in)
to top of rotor hub	3.14 m (10 ft 3½ in)
Tailplane span	2.53 m (8 ft 3½ in)
Skid track	2.09 m (6 ft 10¼ in)
Fuselage/ground clearance beneath cabin	0.39 m (1 ft 3¼ in)

WEIGHTS AND LOADINGS:

Weight empty	1,120 kg (2,469 lb)
Fuel weight (standard)	423 kg (933 lb)
Max T-O weight	2,200 kg (4,850 lb)

PERFORMANCE:

Max level speed	150 kt (278 km/h; 172 mph)
Cruising speed	130 kt (240 km/h; 149 mph)
Hovering ceiling IGE	5,240 m (17,200 ft)
Hovering ceiling OGE:	
Z-11	4,500 m (14,760 ft)
Z-11MB1	6,000 m (19,680 ft)
Max range	324 n miles (600 km; 372 miles)
Endurance	3 h 54 min



Changhe Z-11s at a PLA Aviation school. Serial numbers have been removed by the Chinese censor

1154396

CHRDl

CHINESE HELICOPTER RESEARCH AND DEVELOPMENT INSTITUTE (ZHONGGUO ZHISHENGJI SHEJI YANGJIUSO) (SUBSIDIARY OF AVIC II)

Jingdezhen 333001, Jiangxi
Tel: (+86 798) 848 18 41
Fax: (+86 798) 848 18 14
Web: www.chrdi.com
CHIEF DESIGNER: Wu Ximing
DIRECTOR, INTERNATIONAL CO-OPERATION: Huan Lan

This institute (workforce approximately 2,000) is the overall design authority for Chinese domestic helicopter programmes. Few additional details yet available of Z-10; other projects include 10 tonne helicopter, of which a model showing a provisional configuration was displayed at the November 2006 Airshow China in Zhuhai. At that time, a government go-ahead for this programme was still awaited, and the helicopter had received no official Chinese designation.



November 2006 model showing a possible configuration for a future 10 tonne civil and military helicopter (Robert Hewson) 1154688

CHRDl Z-10

Chinese name: Zhishengji-10 (Vertical take-off aircraft 10)
TYPE: Multirole medium helicopter.
PROGRAMME: Thought to have been initiated in about 1994; Nos. 602 and 608 Institutes reported to have taken part in airframe design. Eurocopter France became partner in programme 15 May 1997 with USD70 million to USD80 million, nine-year contract to



Photograph from unofficial source, claiming to be third (?) prototype Z-10, in WZ-10 combat helicopter configuration 1133943

assist in developing rotor system; joined 22 March 1999 by Agusta (now AgustaWestland) with contract (approximately Lit50 billion; USD30 million) to be responsible for transmission system and vibration analysis. Nomenclature of Chinese Medium Helicopter (CMH) introduced by AgustaWestland in July 2000; officially linked with Z-10 designation by Chinese sources by mid-2002. Reports suggest three transmission sets built in Italy and four, collaboratively, for assembly in China.

In size and weight class of Bell 412 and Sikorsky S-76 (MTOW variously reported as 5, 5.5 or 6 tonnes; 11,023 to 13,227 lb), with capacity for two crew and up to 14 passengers or troops, Z-10 first flight said to have taken place in first half of 2003 (29 April, by c/n 02, quoted by one apparently reliable Chinese source), following start of ground tests in May 2002. Resumed flight testing early 2004 after unspecified modifications; second prototype also flown by that time. Further six aircraft reportedly completed during 2004, of which at least one flown by mid-2005; prototype hours reportedly exceeded 400 by October 2005. One aircraft with China Flight Test Establishment (CFTE) at Yanliang and two with AFPLA unit at Jingdezhen AB at that time. Flight testing planned to end in 2006; eventual production reportedly to be entrusted to Changhe.

CURRENT VERSIONS: **WZ-10**: Attack version; designation **WZ-10M** also seen. Two prototypes thought to be flying by early 2005. Stepped, tandem cockpits (gunner in front), narrow fuselage; stub-wings; fixed, tailwheel-type landing gear; 30 mm undernose cannon, TV/FLIR/laser rangefinder/designator nose turret, with smaller (pilot's night vision?) one above it. Provision for rocket pod and four ATMs (HI-9 or -10) or AAMs under each stub-wing.

Z-10: CMH commercial transport version; fixed, tricycle landing gear. As described.

DESIGN FEATURES: Intended to fulfil tactical military transport, attack helicopter and commercial transport roles. Five-blade, clockwise rotating main and four-blade, starboard side, 'scissors' tail rotors. Lord Corporation elastomeric mounts, bearings and dampers. Intention of both military and civil use suggests that such aspects as composites construction, crashworthy airframe and seats, rotor system ballistic tolerance, engine run-dry capacity and ability to carry slung loads are likely, depending upon version.

POWER PLANT: Two turboshafts. Pratt & Whitney Canada 1,268 kW (1,700 shp) PT6C-67C selected in mid-2001 (10 ordered) to power prototypes; first set of these delivered by end of that year, and all 10 by early 2004; further batch to follow. Production aircraft may later be powered by domestic SAEC WZ9 turboshaft, development of which currently behind schedule.

GAIC

GUIZHOU AVIATION INDUSTRY GROUP (GUIZHOU HANGKONG GONGYE GONGSI) (SUBSIDIARY OF AVIC I)

110 Jinjiang Road, Xiaohe District, Guiyang, Guizhou 550009
Tel: (+86 851) 831 72 31 and 831 72 12
Fax: (+86 851) 831 72 14
e-mail: office@gaic.com.cn
Web: www.gaic.com.cn
CHAIRMAN: Zhou Wancheng
PRESIDENT: Zhang Jun
VICE-PRESIDENT: Zhang Shangdao
DIRECTOR OF PROGRAMMES: Hu Xupir

The Guizhou Aviation Industry Group incorporates many enterprises, factories and institutes engaged in various aerospace and non-aerospace activities; Group employment totals some 51,000 (2004), with assets of CNY10.6 billion; aerospace workforce is about 6,000. Main aircraft manufacturing plants are named Honghu, Honglin, Longyan, Shuangyang and Yunma; other major aerospace companies include Liyang Aero Engine Corporation and Fenglei Armament Factory. Aviation programmes include JL-9 fighter trainer, WP7 and WP13 turbojets, air-to-air missiles and rocket launchers, plus participation in Chengdu (CAC), which see) production of J-7/F-7. GAIC also manufactures maintenance jigs and tools for the Airbus airliner family.

In late 2003, GAIC was negotiating with Aeromot of Brazil with regard to licensed production of a retractable landing gear version of the AMT-600 Guri and possible later manufacture of AMT-200/300 Super Ximango motor gliders. A joint project for a four-seat lightplane was also mentioned. No further news of these projects had emerged by early 2006.



Rear aspect of GAIC FTC-2000 1153782

GAIC FTC-2000 SHANYING, CY-1 and LFC-16

English name: Plateau Eagle

TYPE: Advanced jet trainer.
PROGRAMME: Revealed, as FTC-2000, in model form at Airshow China, November 2000, and as full-size mockup two years later. Proposed as lead-in fighter trainer for CAC FC-1 (which see) and SAC J-8D/F-8D, and as replacement for CAC JJ-7/FT-7. Wind tunnel testing completed by late 2000. Three prototypes under construction by September 2003, first of which then nearing completion; maiden flight (c/n JL90001, serial 421) 13 December 2003. Second prototype (JL90003/422, '02 being static test airframe) flown 3 April 2004, and some 200 hours in 300 flights completed by these two aircraft by June 2005. Pre-series batch of four to six FTC-2000s planned to begin manufacture in 2005 for delivery to AFPLA in 2006. Funding for series production due during 2006-10 Five-Year Plan; if

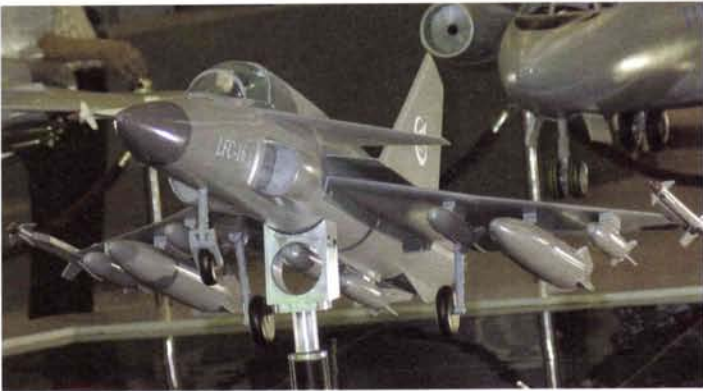
ordered for AFPLA, designation would be **JL-9**, as indicated by prototype's constructor's number.

CURRENT VERSIONS: **FTC-2000**: Tandem-seat trainer version; as described.

CY-1/LFC-16: Modified version, designed by Beijing SuperWing Technology Research Institute and displayed in model form (marked **CY-1**) at November 2002 Airshow China in Zhuhai; would be produced by GAIC if go-ahead received. Features sweptback, shoulder-mounted foreplanes plus what were described as 'side-plate canards' comprising narrow rectangular surface each side of fuselage from just below foreplane trailing-edge to extreme tail, where there are small, rectangular, downward-canted tailfins with small leading-edge strakes. Similar (but single-seat light fighter) model shown in November 2004, with designation **LFC-16**. At that time, GAIC stated to have completed two one-seventh-scale models of LFC-16 for wind tunnel testing and to have plans to begin building first of two prototypes within two years.

CUSTOMERS: None announced by early 2006.

COSTS: Predicted at USD2.4 million, excluding radar.



November 2004 model of single-seat LFC-16 (Jane's/Robert Karniol) 0590215



Prototype FTC-2000 after painting 1121755

DESIGN FEATURES: Upgraded derivative of JJ-7/FT-7, having J-7E double-delta wings, lateral intakes and 'solid' nose to permit installation of fire-control radar. Airframe otherwise similar to JJ-7/FT-7.

FLYING CONTROLS: Conventional mechanical (hydraulic actuation).

LANDING GEAR: Retractable triicycle type, actuated hydraulically. Mainwheels retract inwards, nosewheel forwards.

POWER PLANT: One LMC (Liyang) WP13F (C) turbojet in JL-9/FTC-2000 (43.15 kN; 9,700 lb st dry, 63.25 kN; 14,220 lb st with afterburning). Gravity and pressure refuelling. In-flight refuelling probe (detachable) on starboard side of nose, common with that of J-8D/F-8D. Underfuselage and inboard underwing stations 'wet' for carriage of drop-tanks.

LFC-16 said to have uprated (WS14) turbofan engine providing 76.5 kN (17,196 lb st) with afterburning.

ACCOMMODATION: Crew of two in tandem, on stepped TY6D zero/zero ejection seats. Individual starboard-hinged cockpit canopies; wraparound windscreen.

AVIONICS: *Comms:* Com radio, IFF and ATC transponder.

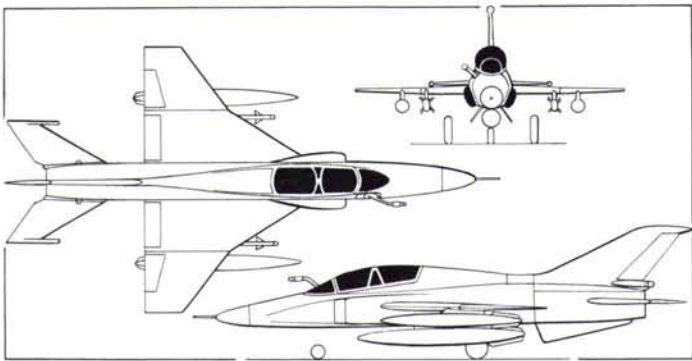
Radar: Pulse Doppler fire-control radar.

Flight: EFIS with HOTAS controls; GPS/INS.

Instrumentation: Two MFDs in each cockpit; HUD in front cockpit, with HUD repeater, rear; air data computer; mission computer; radio compass; radar altimeter; Tacan; marker beacon receiver; RWR; all linked via GJB289A databus.

Mission: Stores management system; video system.

ARMAMENT: Internal gun. Stores attachments under fuselage (one) and wings (two each side). Shown with PL-9 AAMs on outer wing stations and PL-8s inboard.



Provisional drawing of GAIC FTC-2000/JL-9 Shanying (James Goulding) 0589197

Following details all provisional:

DIMENSIONS, EXTERNAL:	
Wing span	8.32 m (27 ft 3 1/2 in)
Wing aspect ratio	2.6
Length overall	14.555 m (47 ft 9 in)
Height overall	4.105 m (13 ft 5 1/2 in)
Wheel track	2.69 m (8 ft 10 in)
Wheelbase	4.87 m (15 ft 11 1/4 in)
AREAS:	
Wings, gross	26.15 m ² (281.5 sq ft)
WEIGHTS AND LOADINGS (FTC-2000):	
Fuel weight: internal	2,060 kg (4,542 lb)
external	1,302 kg (2,870 lb)
T-O weight: clean	7,800 kg (17,196 lb)
max	9,800 kg (21,605 lb)
Max wing loading	374.8 kg/m ² (76.76 lb/sq ft)
Max power loading	155 kg/kN (1.52 lb/lb st)
WEIGHTS AND LOADINGS (LFC-16, estimated):	
Max weapon load	3,500 kg (7,716 lb)
Max T-O weight	9,000 kg (19,841 lb)
PERFORMANCE (FTC-2000, estimated):	
Operating Mach number (MMO)	1.6
Max level speed	648 kt (1,200 km/h; 757 mph) IAS
Unstick speed	135–146 kt (250–270 km/h; 155–168 mph)
Touchdown speed	124–135 kt (230–250 km/h; 143–155 mph)
Min flying speed	114 kt (210 km/h; 131 mph)
Max rate of climb at S/L	15,600 m (51,181 ft)/min
Service ceiling	16,000 m (52,500 ft)
T-O distance	400–500 m (1,315–1,640 ft)
Landing distance	500–600 m (1,640–1,970 ft)
Ferry range with max internal and external fuel	1,349 n miles (2,500 km; 1,553 miles)
Operational endurance	2 h
g limit	+8
PERFORMANCE (LFC-16, estimated):	
Max level speed	M1.8
Unstick speed	124–135 kt (230–250 km/h; 143–155 mph)
Touchdown speed	114–124 kt (210–230 km/h; 131–143 mph)
Service ceiling	17,000 m (55,775 ft)
T-O run	440 m (1,445 ft)
Landing run	490 m (1,610 ft)
Max (ferry) range	1,511 n miles (2,800 km; 1,739 miles)
Endurance	3 h 30 min

HAI

HAFEI AVIATION INDUSTRY COMPANY (HAFEI HANGKONG GONGYE GONGSI) (SUBSIDIARY OF AVIC II)

15 Youxie Street, Pingfang District, Harbin, Heilongjiang 150066
Tel: (+86 451) 650 11 22 and 653 07 36
Fax: (+86 451) 652 01 44
e-mail: hai@hafei.com
Web: www.hafei.com
CHAIRMAN: Wang Bin
PRESIDENT: Cui Xuewen
GENERAL MANAGER: Qu Jingwen
EXECUTIVE DEPUTY GENERAL MANAGER: Xu Zhanbin
PUBLIC RELATIONS OFFICER: Li Changjun

Established as Harbin Aircraft Manufacturing Corporation (Harbin Feiji Zhizao Gongsi; HAMC) 1952, subsequently producing H-5 light bomber (Soviet-designed Il-28) and Z-5 helicopter (Soviet-designed Mi-4) in large numbers, as well as smaller quantities of Chinese-designed SH-5 flying-boat and Y-11 agricultural light twin (NATO reporting name 'Chan-A'). Now a core company of Harbin Aircraft Industry Group (HAIG, which see), along with its sister company Hafei Motor. Occupies 514 ha (1,270 acre) site, including 350,000 m² (3,767,400 sq ft) of workshop space. Workforce in 1998 (latest figure provided) numbered approximately 18,000.

Currently producing own-design Y-12 utility light twin and licence-manufacturing Eurocopter Dauphin 2 as Z-9; also developing new 'Z-X' helicopter. Subcontract work includes Dauphin doors for Eurocopter.

HAI (24 per cent) is partnered by Eurocopter (61 per cent) and Singapore Technologies Aerospace (15 per cent) in the Eurocopter EC 120 Colibri programme, for which it was previously subcontracted to build the cabin module (200th shipset handed over 5 September 2000). This participation was enlarged by an agreement of 20 November 2003 under which HAI was to begin co-production and full local assembly of this helicopter, with a capability to complete 20 aircraft per year for the Chinese market. The official contract was signed in Paris on 11 June 2004, and the first Hafei-assembled EC 120 (Chinese designation HC 120) was expected to roll off the line by the end of that year; the Chinese government has reportedly

ordered an initial batch of eight, with a further 50 on option. The agreement has potential to be extended to cover other Eurocopter types such as the AS 355 and EC 135. HAI is also (with CHAIG) a candidate for co-development and co-production of the Eurocopter EC 175, under a contract concluded in 2005 between AVIC II and the European manufacturer.

Under a 10 June 2004 agreement between Boeing and AVIC II, Boeing announced that it was "developing additional opportunities" for Hafei to produce metallic and composites parts and assemblies for various Boeing airliners, including the 787 Dreamliner.

In September 2003, HAI concluded an agreement with Bell Helicopter Textron for sole-source manufacture of the cabin module, tailboom and other components for the Bell 430; first batch of components had been completed by September 2005 and were due to be shipped to Canada for final assembly at Mirabel, Québec, starting in March 2006.

HAI (EUROCOPTER) Z-9 HAITUN

Chinese name: Zhishengji-9 (Vertical take-off aircraft 9)

English name: Dolphin

TYPE: Light utility helicopter.

PROGRAMME: Licence-built Eurocopter AS 365N Dauphin 2. Licence agreement (Aerospatiale/CATC) signed 2 July 1980; first (French-built) example made initial acceptance flight in China 6 February 1982; Chinese parts manufacture began 1986; initial agreed batch of 50, last of which delivered January 1992. Production continuing under May 1988 domestic contract. Plans to introduce Arriel 2C announced mid-2001, following delivery of two of these engines in April; first flight achieved in September 2001.

ECT Industries (France) signed contract to convert up to 50 Z-9s with NVG-compatible cockpits.

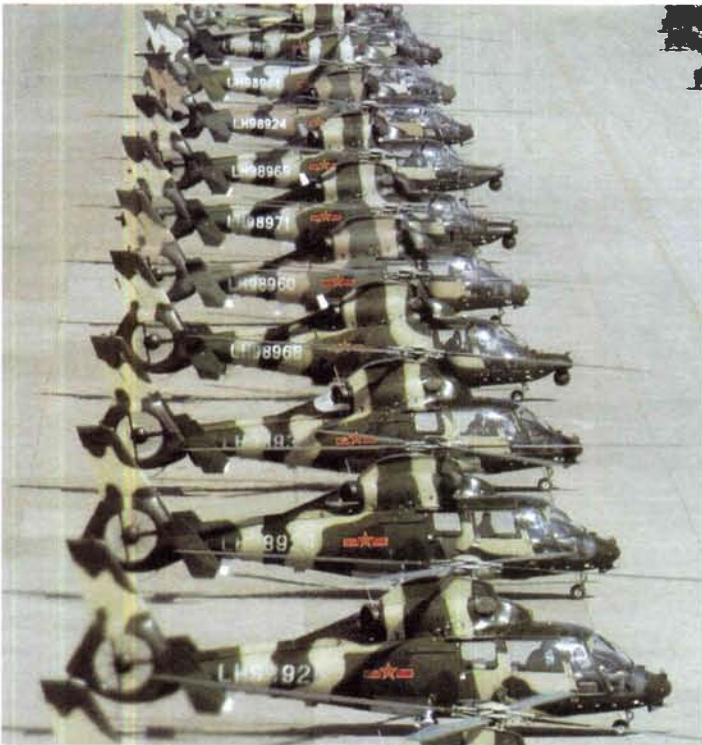
CURRENT VERSIONS: **Z-9:** Initial Chinese version, equivalent to French AS 365 N1 and assembled from French-built kits; 28 completed. Used mainly as troop transport.

Z-9A: Follow-on version, to AS 365N2 standard, built from CKD kits. Final 22 of first 50 were of this version. Some equipped to carry machine gun pods or rocket launchers, but lack roof-mounted sight of more fully armed WZ-9 version.

HAI approached in early 2004 by Dirgantara with proposal to produce Z-9A in Indonesia to meet an Indonesian Army requirement; not taken up by mid-2006.



Unidentified WZ-9 variant with chin-mounted sensor turret, first noted in 2006 1158098



HAI WZ-9s of 9th Army Aviation Regiment, Beijing region, of which new examples LH98968, '969 and '971 have chin turrets 1158099

Data apply to Z-9A except where indicated.

Z-9A C²: Reported designation of command and control (command post) version for artillery fire direction.

Z-9A-100: Effectively, prototypes for domestic licence-built version, with WZ8A engines and much increased local manufacture (72.2 per cent of airframe and 91 per cent of engine). Two built; first flight 16 January 1992; flight test programme completed 20 November 1992 after almost 200 flight hours (408 flights); Chinese type approval received 30 December 1992.

Z-9B: First indigenous production version, based on Z-9A-100. Modified Fenestron with 11 wider-chord, all-composites blades instead of 13 metal blades as in AS 365N1. Principal unarmed PLA version for SAR, artillery direction, EW, troop transport (accommodates eight), communications and other utility duties. Certified also for domestic commercial operations 19 April 2001.

Z-9EC: Version for PLA Naval Aviation (6th Naval Independent Regiment) for deployment aboard certain older classes of destroyers and frigates; known to be flying by late 2000; Arriel 2C/WZ8C engines. Believed to be equivalent to Eurocopter AS 565MA Panther, but equipped with Thales HS-12 dipping sonar and KLC-1 I/J-band (Chinese version of Agrion 15) surface search radar; armament includes two Yu-7 torpedoes or TV-guided C-701 anti-surface vessel missiles. May have entered limited production by late 2003.

DZ-9: Reported designation of electronic warfare version (also reported as **Z-9EW**) for communications jamming.

WZ-9: Armed (*wuzhuang*) version (also reported as **Z-9W**); four Norinco HJ-8A (Hongjian: Red Arrow) wire-guided anti-tank missiles, twin 12.7 mm machine gun or 23 mm cannon pods, or twin 57 or 90 mm rocket pods, and gyro-stabilised, roof-mounted optical sight. First flight thought to have been in early 1989; in production. Export designation **Z-9G**, available with or without roof-mounted sight.

At Zhuhai in November 2004, HAI showed a Z-9G model armed with eight ATMs, but with sighting turret positioned below the nose.

A photograph shown on an Internet website has illustrated a model of a dedicated attack helicopter, clearly based on the Z-9 airframe but having a modified nose embodying a side-by-side two-person cockpit. Armament and equipment includes up to four HJ-8A anti-tank missiles or TY-90 IR-guided short-range AAMs, nose-mounted FLIR and roof-mounted optical sighting system.

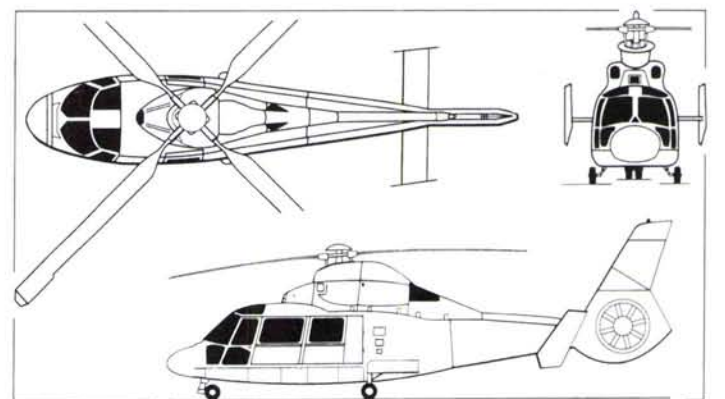
H410A: Version with 626 kW (840 shp) Arriel 2C (WZ8C) turboshafts for improved 'hot-and-high' performance. (Designation signifies 4.10 tonne MTOW.) First flight September 2001; CAAC certification 10 July 2002. Initial orders for eight.



Z-9G armed helicopter 1153756



Z-9G in anti-tank configuration 1153755



HAI Z-9A light utility helicopter (Paul Jackson) 1158035

H425: Further-improved (4.25 tonne MTOW) development of H410A. Retains Arriel 2C engines, but features 200 mm (7¾ in) wider cabin, redesigned main rotor blade tips, Rockwell Collins 'glass cockpit' avionics, crashworthy fuel system and structure, and improved interior layout. First flight 30 December 2003; targeted to achieve certification by end of 2004.

H450: Projected (4.50 tonne MTOW) development of H425: further improvements to rotors, transmission and control system.

CUSTOMERS: Total 180 (all versions) reportedly built by late 2003; eight H410As ordered mid-2002 by Far Eastern Leasing Company, China State Oceanic Administration and Zhoushan Civil Aviation Development Company.

Most early production for Chinese armed services (People's Naval Aviation and Army Aviation) and, more recently, People's Armed Police (four delivered 12 September 2001). Entered service with two PLA army groups January and February 1988 (Beijing and Shenyang Military Regions respectively); units include 6th, 8th and 9th Army Aviation Regiments. Also with AFPLA unit in Hong Kong. According to one estimate in late 2003, Army then had some 61 Z-99As and 31 WZ-9s in service. People's Naval Aviation believed to use Z-9A for commando transport as well as shipboard communications. Ten based at former Royal Air Force airfield at Sek Kong in third quarter of 1997, following 1 July handover of Hong Kong by UK. First export made in late 2000 (two Z-9As to Mali Air Force). Mauritanian Air Force received two Z-9As in 2003; at least one other to Mali for military use, Pakistan Navy a prospective customer in 2004-05 for four Z-9Cs.

Civil models used for various duties including offshore oil rig support and air ambulance (four stretchers/two seats or two stretchers/five seats). In 1992, Flying Dragon Aviation received two (late production Z-9s, augmenting an Aerospatiale Dauphin) which are operated on behalf of the Ministry of Forestry. Five civil Z-9s ordered by Shenzhen Financial Leasing Company (SFLC) in 2001. One Z-9A deployed to Arctic regions in mid-1999, on scientific survey ship.

STRUCTURE: Transmission manufactured by Dongan Engine Manufacturing Company at Harbin, hubs and tail rotor blades by Baoding Propeller Factory.

POWER PLANT: Two 526 kW (705 shp) Turbomeca Arriel 1C1 turboshafts, produced by SAEC at Zhuzhou as WZ8A. From 2001, H410A and H425 powered by 626 kW (840 shp) Arriel



Z-9G scout version

1153754



HAI Z-9 with Chinese Army serial number censored

1153753

2Cs as WZ8C. Contract signed 5 December 2005 between AVIC II and Turbomeca parent Safran for supply of 200 Arriel 2 engines, plus a partial production licence, for installation in H425.

Fuel capacities 1,158 litres (306 US gallons; 255 Imp gallons) in Z-9A and Z-9G; 1,058 litres (279.5 US gallons; 233 Imp gallons) in Z-9; and 1,136 litres (300 US gallons; 250 Imp gallons) in H425. Option for 180 litre (47.5 US gallon; 39.6 Imp gallon) auxiliary tank.

ACCOMMODATION: One/two pilots and 12/13 passengers standard.

EQUIPMENT: Can include Breeze-Eastern HS-20200 electric hoist, external sling, searchlight and loudhailer.

ARMAMENT (WZ-9): Up to four HJ-8A or HJ-8E ATMs (range 1.6 n miles; 3 km; 1.9 miles); twin 12.7 mm or 23 mm gun pods; or two pods of 57 or 90 mm rockets. Possible other weapons include TY-90 IR-guided AAM (already test-flown on Z-9 in 1998; range of 3.2 n miles; 6 km; 3.7 miles) and C-701 TV-guided anti-ship missile (8.1 n miles; 15 km; 9.3 miles).

DIMENSIONS EXTERNAL:

Main rotor diameter: Z-9	11.94 m (39 ft 2 in)
H425	12.00 m (39 ft 4½ in)
Tail rotor diameter	1.10 m (3 ft 7¼ in)
Length overall, rotors turning	13.68 m (44 ft 10½ in)
Fuselage length: Z-9A, Z-9G	11.63 m (38 ft 1¾ in)
Z-9C	12.085 m (39 ft 7¾ in)
H425	12.04 m (39 ft 6 in)
Height: to top of rotor hub	3.49 m (11 ft 5½ in)
overall (tip of tailfin)	3.97 m (13 ft 0¼ in)
Tail unit span	3.21 m (10 ft 6½ in)
Wheel track	2.02 m (6 ft 7½ in)
Wheelbase	3.64 m (11 ft 11¼ in)
Ground clearance: beneath cabin	0.40 m (1 ft 3¾ in)
beneath Fenestron	0.58 m (1 ft 10¼ in)

AREAS:

Main rotor disc: Z-9	112.0 m² (1,205.6 sq ft)
H425	113.1 m² (1,217.4 sq ft)
Tail rotor disc	0.95 m² (10.23 sq ft)

WEIGHTS AND LOADINGS:

Weight empty, equipped: Z-9A and EC	2,050 kg (4,519 lb)
Z-9G	2,462 kg (5,428 lb)
Standard fuel weight: Z-9A and G	900 kg (1,984 lb)

Max payload: Z-9A and EC	2,038 kg (4,493 lb)
H425	2,088 kg (4,603 lb)
Max load on cargo sling: Z-9A and EC, H425	1,600 kg (3,527 lb)
Max load on rescue hoist: H425	270 kg (595 lb)
Max T-O weight, internal or external load:	
Z-9A, EC and G, H410A	4,100 kg (9,039 lb)
H425	4,250 kg (9,369 lb)

PERFORMANCE:

Never-exceed speed (VNE): Z-9A and G, H425	170 kt (315 km/h; 195 mph)
Z-9EC	159 kt (296 km/h; 183 mph)
Max cruising speed at S/L: Z-9A, H425	151 kt (280 km/h; 174 mph)
Z-9EC	134 kt (249 km/h; 155 mph)
Z-9G	138 kt (255 km/h; 158 mph)

Max vertical rate of climb at S/L:

Z-9A	252 m (827 ft)/min
Z-9EC	168 m (551 ft)/min
Z-9G	more than 240 m (787 ft)/min

Max forward rate of climb at S/L:

Z-9A	396 m (1,299 ft)/min
Z-9EC	492 m (1,614 ft)/min
Z-9G	more than 480 m (1,575 ft)/min
H425	462 m (1,516 ft)/min

Service ceiling: Z-9A

Z-9EC	4,570 m (15,000 ft)
Z-9G	4,300 m (14,100 ft)
H425	5,000 m (16,400 ft)
	6,000 m (19,680 ft)

Hovering ceiling:

IGE: Z-9A	2,150 m (7,050 ft)
Z-9EC	2,250 m (7,380 ft)
Z-9G	3,400 m (11,150 ft)
H425	2,672 m (8,765 ft)
OGE: Z-9A	1,150 m (3,770 ft)
Z-9EC	1,050 m (3,445 ft)
Z-9G	2,500 m (8,200 ft)
H425	1,320 m (4,330 ft)

Max range at 135 kt (250 km/h; 155 mph) normal cruising speed, no reserves:

standard tanks:	
Z-9A and G	464 n miles (860 km; 534 miles)
Z-9EC	236 n miles (438 km; 272 miles)
H425	432 n miles (800 km; 497 miles)
with auxiliary tank:	
Z-9A	539 n miles (1,000 km; 621 miles)
Endurance: Z-9G	4 h 20 min

HAI 'Z-X'

TYPE: Light utility helicopter.

PROGRAMME: The new light utility helicopter previously known only by this designation has now been identified as the Z-15. A joint venture with Eurocopter (as the EC 175), it is accordingly now described under that combined heading in the International section of *Jane's All the World's Aircraft*.

HAI Y-12

Chinese name: Yunshuji-12 (Transport aircraft 12)

TYPE: Twin-turboprop light transport.

PROGRAMME: Y-12 (II) initiated as uprated version of Y-12 (I); first flight 16 August 1984. Y-12 (IV) (B-569L, first flight 30 August 1993) received production approval September 1995. Currently certified in Australia, Canada, China, France, New Zealand, UK and USA.

CURRENT VERSIONS: **Y-12 (III)**: Major production version; higher-rated engines, no leading-edge slats and smaller ventral fin. Certified by CAAC 25 December 1985 and UK CAA (BCAR Section K) 20 June 1990.

Detailed description applies to Y-12 (II) except where indicated.

Y-12 (IV): Improved version with sweptback wingtips; modifications to control surface actuation, main gear and brakes; redesigned seating for 18 to 19 passengers; starboard side rear baggage door; maximum payload and maximum T-O weight increased. Further changes include Rockwell Collins or Honeywell com/nav for both VFR and IFR, plus optional colour weather radar, GPS, Omega navigation, wing and tail de-icing, and oxygen system. Domestic certification received 3 July 1994 and FAR Pt 23 approval on 26 March 1995; Indonesian certification 16 November 2000. Sichuan Airlines order for 20 (7 November 2000) assumed to be of this version.

Y-12E Harbinger: Next-generation version for Chinese market; PT6A-135A engines and four-blade lightweight propellers for improved 'hot and high' performance, plus strengthened structure, reduced noise levels and improved avionics. Announced at Airshow China, November 2000; passed CAAC preliminary design review 16 November 2000. First flight (B-610L) August 2001; award of CAAC type certificate announced 26 February 2002; FAA certification 2 August 2006; launch customer Sichuan Airlines (option for 10). Twelve engines for Y-12E delivered by February 2004; three aircraft said to be in service in China at that time.

Y-12AEW: Being promoted in 2004; bulged nose housing Racal Skymaster AEW and maritime surveillance radar.

Y-12F: Concept study for version with pressurised fuselage and retractable landing gear.

Y-12G: In design stage 2002-03 as dedicated cargo version with large side door and capacity for three LD3 containers. No subsequent reports seen.

CUSTOMERS: See table. According to a CATIC announcement in August 2001, sales then totalled 130, of which 114 had been delivered. In February 2004, Pratt & Whitney Canada confirmed shipment of some 300 PT6A-27 engines since beginning of Y-12 programme. In November 2004, CATIC announced purchase of 20 Y-12s against possible further export sales, though none reported by end 2006.

COSTS: Batch of 15 PT6-engined aircraft valued at US\$58 million (1999).

DESIGN FEATURES: Designed to standards of FAR Pts 23 and 135 Appendix A and developed to improve upon modest payload/range of piston-engined Y-11. Constant-chord high braced wings, with small stub-wings at cabin floor level supporting mainwheel units; basically rectangular-section fuselage, upswept at rear; non-swept tail surfaces; large dorsal fin; ventral fin under tailcone.

Wing section LS(1)-0417; thickness/chord ratio 17 per cent; dihedral 1° 41'; incidence 4°.

FLYING CONTROLS: Conventional and manual. Drooping ailerons, horn-balanced elevators and rudder; trim tab in starboard aileron, rudder and each elevator. Control surface movement: ailerons 25° up/18° down; aileron trim tab 20° up/down; elevator 25° up/10° down; elevator trim tab 7° up/20° down; rudder 22° left/right; rudder trim tab 9° left/right. Electrically actuated two-segment double-slotted flaps (deflection angles 10 and 20°) on each wing trailing-edge.

STRUCTURE: Conventional all-metal structure with two-spar fail-safe wings and stressed skin fuselage; Ziqiang-2 resin bonding on 70 per cent of wing structure and 40 per cent of fuselage; integral fuel tankage in wing spar box; bracing strut from each stub-wing out to approximately one-third span.

LANDING GEAR: Non-retractable tricycle type, with oleo-pneumatic shock-absorber in each unit. Single-wheel main units, attached to underside of stub-wings. Single trailing-link, non-steerable nosewheel. Mainwheel tyres size 640x230, pressure 5.50 bar (80 lb/sq in); nosewheel tyre size 480x200, pressure 3.50 bar (51 lb/sq in). Hydraulic brakes. Minimum ground turning radius 16.75 m (54 ft 1 1/2 in).

POWER PLANT: Y-12 (II) and (IV): Two Pratt & Whitney Canada PT6A-27 turboprops, each flat-rated at 462 kW (620 shp) and driving a Hartzell HC-B3TN-3B/T10173B-3 or 'NB3 three-blade constant-speed reversible-pitch metal propeller.

Y-12E: Two 559 kW (750 shp) Pratt & Whitney Canada PT6A-135A turboprops, derated



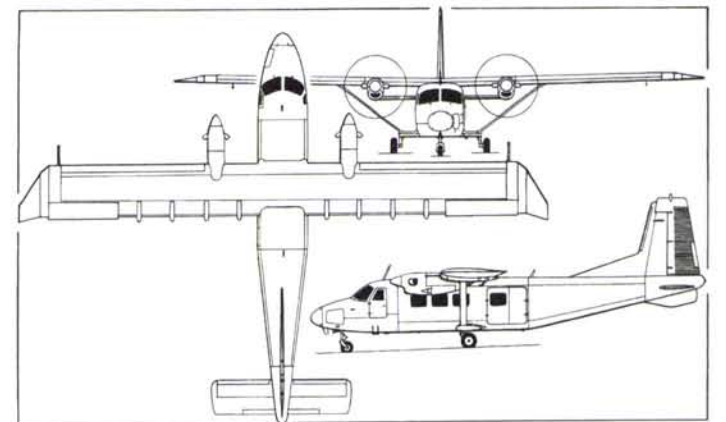
HAI Y-12 (IV) light transport

1158862



HAI Y-12 cockpit

1153768



HAI Y-12 (IV) twin-turboprop STOL general purpose transport (James Goulding)

1158757

to 462 kW (620 shp) and driving Hartzell HC-D4N-3N/D9511FK four-blade constant-speed, reversible-pitch, metal propellers.

All fuel in tanks in wing spar box, total capacity 1,630 litres (431 US gallons; 359 Imp gallons), with overwing gravity filling point each side. Oil capacity 17.5 litres (4.62 US gallons; 3.85 Imp gallons).

No recent news of domestic WJ9 turboprop (442 to 520 kW; 593 to 697 shp), said to have been under development for Y-12 and other aircraft.

ACCOMMODATION: Crew of two on flight deck, with access via forward-opening door on port side. Four-way adjustable crew seats. Dual controls. Main cabin can accommodate up to 19 passengers (218 in Y-12E) in commuter configuration, in three-abreast layout (with aisle), at seat pitch of 71 cm (28 in). Alternative layouts for up to 15 parachutists, or all-cargo configuration with 11 tiedown rings. Air ambulance (six stretchers plus four patient or medical attendant seats) and VIP layouts also available. Passenger/cargo double door on port side at rear, rear half of which opens outward and forward half inward; foldout steps in passenger entrance. Emergency exit on each side at front of cabin and opposite passenger door on starboard side at rear. Baggage compartment in nose and at rear of passenger cabin. SYSTEMS: Hamilton Sundstrand R70-3WG environmental control system. Hydraulic system (operating pressure 118 to 147 bar; 1,711 to 2,132 lb/sq in) for mainwheel brakes. Two 6 kW DC starter/generators, two 600 VA 400 Hz single-phase static inverters and one 43 Ah Ni/Cd battery for electrical power. Goodrich Type 29S-7D 5178 anti-icing system optional for wing, tailplane and fin leading-edges. Oxygen system optional.

AVIONICS: *Comms*: VHF-251 and HF-230 radio, AUD-251A intercom and TDR-950 transponder.

Radar: Honeywell 1400C, RDS-81 or RDS-82 colour weather radar optional.

Flight: ALT-50 radio altimeter, DME-451, ADF-650A, MKR-350 marker beacon receiver, KLN 90 GPS receiver (optional), VIR-351 VOR, GLS-350 glideslope receiver and PN-101 pictorial navigation display. Doppler navigation with satellite responder (Y-12 (IV), Omega nav) optional (for example, in mineral detection role).

Instrumentation: 20025-11324 airspeed indicator, 510-8D10 horizon, 101420-11934 encoding altimeter, 30230-11101 vertical speed indicator, 9551-BN541 bank indicator, LC-2 magnetic compass, ZWH-1 outside air temperature indicator, and ZEY-1 flap position indicator; dual engine torque meters, interturbine temperature indicators, gas generator tachometers, oil temperature and pressure indicators, fuel pressure and quantity indicators; 309W clock; and XDH-10B warning light box. Flight data recorder and GPWS optional on Y-12E.

EQUIPMENT: Hopper for 1,200 litres (317 US gallons; 264 Imp gallons) of dry or liquid chemical in agricultural version. Appropriate specialised equipment for firefighting, geophysical survey (for example, long, kinked sensor tailboom) and other missions.

DIMENSIONS, EXTERNAL:

Wing span: Y-12 (II)	17.235 m (56 ft 6 1/2 in)
Y-12 (IV), Y-12E	19.20 m (63 ft 0 in)
Wing chord, constant	1.96 m (6 ft 5 1/4 in)
Wing aspect ratio: Y-12 (II)	8.7
Y-12 (IV), Y-12E	10.0
Length overall	14.86 m (48 ft 9 in)
Height overall	5.675 m (18 ft 7 1/2 in)
Elevator span	5.365 m (17 ft 7 1/4 in)
Wheel track	3.61 m (11 ft 10 1/4 in)

Y12 (I) AND Y-12 (II) DELIVERIES
(at mid-2002)

Country ²	Operator	Quantity	First Aircraft
Domestic (mostly Y-12 (I))			
China	AVIC (No. 630 Institute)	1	B-3820
	China General Aviation	5	B-3810
	China Southwest Airlines	4	B-3811
	Flying Dragon Aviation	9	B-3802
	Guizhou Aviation Corporation	1	B-3809
	State Oceanic Administration	1	?
	Subtotal	21	
Export			
Australia	Aviex	1	VH-LLK
Bangladesh	Aero Bengal Airlines	2	?
Cambodia	Air Force	2	XU-016
Egypt	Air Force	2	?
Eritrea	Air Force	3	ER 800
	Red Sea Air ¹	1	E3-AAI
Fiji	Fiji Air	3	DQ-FHF
Guyana	Defence Force	1	8R-GDS
Iran	Air Force	9	15-2245
Kenya	Air Force	12	128?
Kiribati	Air Kiribati	1	T3-ATI
Laos	Lao Aviation	7	RDPL-34115
Malaysia	Berjaya Air Charter	2	9M-TAB
Mauritania	Air Force	2	5T-MAE
Mongolia	Mongolian Airlines	6	D-0064
Namibia	Defence Force	2	NDF97-600
Nepal	Nepal Airways	5	9N-ACD
Pakistan	Air Force	2	96-035
	Army	4	045
Peru	Air Force	6	333
	National Police	3	224
Philippines	Philippine Eagle Airlines	3	RP-C1518
Sri Lanka	Air Force	9	CR-851
Tanzania	Air Force	2	JW9029
Zambia	Air Force	4	AF214
	Subtotal	94	
Total		115	

¹ Unclear if aircraft is ex-military
² CATIC also reports sales to Argentina, Bolivia, Canada, Cuba and Sudan

Wheelbase	4.70 m (15 ft 5 in)
Propeller diameter: PT6A-27	2.49 m (8 ft 2 in)
PT6A-135A	2.44 m (8 ft 0 in)
Propeller ground clearance	1.325 m (4 ft 4¼ in)
Distance between propeller centres	4.94 m (16 ft 2½ in)
Fuselage ground clearance	0.65 m (2 ft 1½ in)
Crew door: Height	1.12 m (3 ft 8 in)
Width	0.65 m (2 ft 1½ in)
Passenger/cargo door: Height	1.38 m (4 ft 6¼ in)
Width (passenger door only)	0.65 m (2 ft 1½ in)
Width (double door)	1.45 m (4 ft 9 in)
Emergency exits (three, each): Height	0.68 m (2 ft 2¾ in)
Width	0.68 m (2 ft 2¾ in)
Baggage door (nose, port): Max height	0.56 m (1 ft 10 in)
Width	0.75 m (2 ft 5½ in)

DIMENSIONS, INTERNAL:

Cabin, excl flight deck and rear baggage compartment:	
Length	4.82 m (15 ft 9¾ in)
Max width	1.46 m (4 ft 9½ in)
Aisle width	0.23 m (9 in)
Max height	1.70 m (5 ft 7 in)
Floor area	7.0 m ² (75.8 sq ft)
Volume	12.9 m ³ (455 cu ft)
Baggage compartment volume:	
nose	0.77 m ³ (27.2 cu ft)
rear	1.89 m ³ (66.7 cu ft)

AREAS:

Wings, gross: Y-12 (II)	34.27 m ² (368.9 sq ft)
Y-12 (IV), Y-12E	36.90 m ² (397.2 sq ft)
Ailerons (total, incl tab)	2.88 m ² (31.00 sq ft)
Trailing-edge flaps (total)	6.00 m ² (64.58 sq ft)
Fin, incl dorsal fin	2.24 m ² (24.11 sq ft)
Rudder, incl tab	3.34 m ² (35.95 sq ft)
Tailplane	3.10 m ² (33.37 sq ft)
Elevators (total, incl tabs)	4.06 m ² (43.70 sq ft)

WEIGHTS AND LOADINGS (A: Y-12 (II), B: Y-12 (IV), C: Y-12E):

Max usable fuel weight: A, B, C	1,230 kg (2,712 lb)
Max payload: A	1,700 kg (3,748 lb)
B, C	1,984 kg (4,374 lb)
Baggage compartment weight (A, B, C):	
fwd	100 kg (220 lb)
rear	260 kg (573 lb)
Max T-O weight: A	5,300 kg (11,684 lb)
B, C	5,670 kg (12,500 lb)
Max ramp weight: A	5,330 kg (11,750 lb)
B, C	5,700 kg (12,566 lb)
Max landing weight: A	5,300 kg (11,684 lb)
B, C	5,400 kg (11,905 lb)
Max zero-fuel weight: A	4,900 kg (10,803 lb)
B, C	5,188 kg (11,438 lb)
Max cabin floor loading (cargo): A, B	750 kg/m ² (154 lb/sq ft)

Max wing loading: A	145.9 kg/m ² (29.90 lb/sq ft)
B, C	153.7 kg/m ² (31.47 lb/sq ft)
Max power loading: A	5.74 kg/kW (9.42 lb/shp)
B, C	6.14 kg/kW (10.08 lb/shp)

PERFORMANCE (A, B and C as above):

Max operating speed (VMO) at FL100:	
A at FL100	177 kt (328 km/h; 204 mph) TAS
B, C	162 kt (300 km/h; 186 mph) CAS
Max cruising speed at FL100: A	
Econ cruising speed at FL100: A	
B	135 kt (250 km/h; 155 mph)
C	140 kt (260 km/h; 162 mph)
Max manoeuvring speed (VA): B, C	
Max speed for flap extension (VFE): B, C	
Min control speed (VMC): B	
C	70 kt (129 km/h; 80 mph) CAS
Max rate of climb at S/L: A	
B, C	486 m (1,594 ft)/min
Rate of climb at S/L, OEI: A	
B	84 m (275 ft)/min
C	90 m (295 ft)/min
Max operating altitude: A, B, C	
Service ceiling, OEI, 15 m (50 ft)/min rate of climb, max continuous power:	
A	3,000 m (9,840 ft)
C	4,145 m (13,600 ft)
T-O run, 15° flap: normal: A	
B	340 m (1,115 ft)
C	370 m (1,215 ft)
STOL: A	
C	230 m (755 ft)
T-O to 15 m (50 ft), 15° flap: normal: A	
B	420 m (1,380 ft)
STOL: A	490 m (1,610 ft)
STOL: A	370 m (1,215 ft)
Landing from 15 m (50 ft), 20° flap: with braking and propeller reversal:	
normal: A	
STOL: A, B	480 m (1,575 ft)
C	370 m (1,215 ft)
with brakes only: normal: A	
B	320 m (1,050 ft)
C	620 m (2,035 ft)
STOL: A	
C	630 m (2,070 ft)
Landing run, 20° flap:	
with braking and propeller reversal: A	
with brakes only: A, B	
C	330 m (1,085 ft)
Range at econ cruising speed at FL100 with max fuel, 45 min reserves:	
A, C	723 n miles (1,340 km; 832 miles)
B	707 n miles (1,310 km; 814 miles)
Endurance, conditions as above: A	
B	5 h 12 min
B	5 h 15 min

HAIC

HONGDU AVIATION INDUSTRY GROUP
(HONGDU HANGKONG GONGYE GONGSI)
(SUBSIDIARY OF AVIC II)

Xinxiao, PO Box 5001-506, Nanchang, Jiangxi 330024

Tel: (+86 791) 846 95 55 and 845 29 32

Fax: (+86 791) 846 82 24

e-mail: aerobiz@hongdu.com.cn

Web: www.hongdu.com.cn

PRESIDENT: Jiang Liang

DEPUTY GENERAL MANAGER, CIVIL AIRCRAFT DIVISION: Huang Xuejun

Following the division of AVIC's responsibilities in 1999, Hongdu Aviation Industry Group became the parent organisation of the former Nanchang Aircraft Manufacturing Company (NAMC). HAIC, which had a 2003 workforce of 5,600, also manufactures motorcycles, textile machinery and a range of other non-aerospace products.

NAMC, which became a core unit of HAIC in 1998, was created in 1951 as the state-owned Hongdu Machinery Building Factory; it built 379 CJ-5s (licence Soviet Yak-18s) between 1954 and 1958, and in 1960s shared in large production programme for J-6 fighter (Chinese development of MiG-19); also built (1957-68) 727 Y-5 (Chinese An-2) biplanes. Current programmes include L-15 and JL-8/K-8 jet trainers. Agreements with and via Canadian Aerospace Group in 1998 provided for North American assembly and marketing of N-5A agricultural aircraft in return for option to build CAG Windeagle and Monitor Jet in China; however, Canadian project subsequently foundered. Also built prototype of NLA AC-500 Air Car. Assembly of MD 500/600 helicopters is delegated to HMDH subsidiary (which see).

The company occupies a 500 ha (1,235 acre) site, with 10,000 m² (107,600 sq ft) of covered space, and delivered its 4,000th aircraft in 1993.

HAIC Q-5J

TYPE: Advanced jet trainer.

PROGRAMME: Q-5 (Western A-5) attack fighter first flew in 1965, but derived from earlier F-6/MiG-19. Believed now to be obsolete, although HAIC showed a model of a tandem-seat, armed "JQ-5J" at the Zhuhai Air Show in November 2004. A prototype flew on 25 February 2005, the designation now being unofficially quoted as Q-5J. Fin height has been increased to offset the addition of a second cockpit. In view of the more advanced aircraft designs now available to the PLAAF, the rationale of this belated version is not immediately apparent, except as a replacement for the even older JJ-6 trainers used for instruction and flight-checking by Q-5 regiments.

POWER PLANT: Two jet engines, each 44.3 kN (9,950 lb st) with afterburning. Provision for two drop-tanks, each 760 litres (201 US gallons; 167 Imp gallons).

ACCOMMODATION: Two in tandem beneath individual, starboard-hinged canopies; separate windscreen.

DIMENSIONS, EXTERNAL:

Wing span 9.70 m (31 ft 10 in)
Length overall 17.11 m (56 ft 1½ in)
Height overall 4.815 m (15 ft 9½ in)

PERFORMANCE:

Max level speed 659 kt (1,220 km/h; 758 mph)
Landing speed 160 kt (297 km/h; 185 mph)
Max rate of climb at S/L 8,100 m (26,575 ft)/min
Service ceiling 14,800 m (48,560 ft)
T-O run 645 m (2,120 ft)
Landing run 867 m (2,845 ft)
Range with max two drop-tanks 873 n miles (1,617 km; 1,004 miles)
Endurance with two drop-tanks 2 h 10 min
g limits +7.5



Prototype of tandem-seat Hongdu/Nanchang Q-5J

1151016

HAIC CJ-6A

Chinese name: Chuji Jiaolianji-6A (Basic training aircraft 6A)

Westernised designation: PT-6A

TYPE: Basic prop trainer.

PROGRAMME: Design initiated at Shenyang in second half of 1957 as Chinese-engineered successor to CJ-5 (licence Yak-18; see 1991-92 and earlier editions); first flight of first prototype (108 kW; 145 hp Mikulin M-11ER engine) 27 August 1958, but trials disappointing; modified version with 194 kW (260 hp) Ivchenko AI-14R made first flight 18 July 1960. Responsibility subsequently transferred to Nanchang, further redesign by NAMC (now HAIC) preceding first flight of production-standard prototype 15 October 1961; production go-ahead for aircraft January 1962, for HS6 engine (Chinese AI-14R) June 1962. Despite regular reports of production termination, low rate manufacture appeared to be proceeding in 2005, as suggested by continued promotion under Western name of 'Swallow'.

CURRENT VERSIONS: **CJ-6A:** Standard version from December 1965, with uprated HS6A engine.

CJ-6B: Armed version; 10 built 1964-66.

Haian A: Prototype of civil agricultural version, described in 1991-92 and earlier editions. Programme superseded by N-5A.

CUSTOMERS: Total of 1,796 (all versions) built by end of 1986 (or perhaps earlier), mainly for PLA Air Force but including well over 200 for foreign military customers. Exported to Albania (20), Bangladesh (36), Cambodia, North Korea, Sri Lanka (10), Tanzania and Zambia (10). Large numbers of ex-PLA aircraft disposed of to civilian owners in Australia (from 1991), UK, US and elsewhere. Main production at factory No. 320 in 52 batches from 1962 to about 1992; no evidence of batches 53 to 63, but aircraft of batch 64 have included 6432033 and 6432034 to US in 2001 and 6432041 and 64032042 to Australia in 2004. Factory No. 512 also built some 300 in five batches (numbered 27 to 31) 1970 to 1976.

HAIC JL-8

Chinese name: Jiaolianji 8 (Training aircraft 8)

Export designation: K-8 Karakoram

TYPE: Basic jet trainer/light attack jet.

PROGRAMME: Launched publicly (as NAMC L-8) at 1987 Paris Air Show as proposed export aircraft to be developed jointly with international partner. Subsequently proposed to be co-developed with Pakistan as partner (25 per cent share); aircraft then redesignated K-8 and named after mountain range forming part of China/Pakistan border. Pakistan decided 1994 against own assembly line, but agreed to reconsider if subcontracting share (12 per cent initially, but being increased to 25 per cent in mid-2001 by addition of front fuselage) should later increase to 45 per cent.

Manufacture of four prototypes started January 1989; three flying prototypes: 001 (first flight 21 November 1990), 003 (first flight 18 October 1991) and 004; 002 is static and fatigue test aircraft.

First preproduction aircraft (1001/L8 320101) used as demonstrator. Preproduction batch of six for Pakistan Air Force evaluation (ordered 9 April 1994) handed over in China on 21 September 1994 and delivered to PAF on 10 November that year; PAF evaluation (approximately 1,200 hours) completed in August 1995; aircraft reported subsequently in use from Air Academy, Risalpur. China importing Progress AI-25 turboprops for use in domestic JL-8 version (see under Power Plant). One aircraft in use from 1997 by China Flight Test Establishment as variable stability testbed (K-8VSA) with fly-by-wire flight control system.

According to PAC spokesman early 2005, company then planning to increase annual output of components for K-8, but due to slow rate of acquisition from China had abandoned all intention of in-country final assembly and decided to restrict total PAF procurement to 39 aircraft.

CURRENT VERSIONS: **K-8:** Initial version with TFE731 engine; as described.

K-8E: TFE731-powered version for Egyptian Air Force, 80 of which ordered under contract signed on 27 December 1999. First 10 Chinese-built (first flight 5 July 2000); Arab Organisation for Industrialisation (AOI) then assembling batches of 15 and 10 from CKD kits of medium-sized and smaller components respectively before progressing to 90 per cent local manufacture of final 45; first kit-assembled K-8E completed mid-2001 and final example in December 2005. Chinese Certificate of Recognition for Phase 2 of co-production programme awarded August 2005. Total of 33 items newly selected, developed or upgraded for this version include instrument panels and consoles; com/nav systems; fire-control system; fuel system; environmental control system; hydraulic system; and landing gear.

JL-8: Designation of Chinese domestic version fitted with AI-25 engine.

K-8VSA: In-flight variable stability testbed (serial number 320203), in use from 1997 by China Flight Test Establishment (CFTE). Equipped with digital fly-by-wire AFCS, sidestick controller and data acquisition system.

CUSTOMERS: Total of 12 preproduction K-8s (six each to AFPLA and Pakistan Air Force) delivered by end of 1996. Second batch of six delivered to Pakistan Air Force in late 2003. Original joint venture agreement reportedly involved up to 75 for Pakistan Air Force, but Pakistan Secretary for Defence Production quoted in early 1996 as saying up to 100 needed eventually to replace Cessna T-37; however, SLEP for T-37 postponed main K-8 requirement to 2005, when further 27 approved on 30 June 2005, with designation **K-8P** and



HAIC CJ-6A in Chinese markings, but owned by a US operator (Paul Jackson)

1158005



Zambian Air Force HAIC K-8

1195782



Chinese Air Force HAIC K-8 jet trainers of 13th Flying Academy at Bengbu

1151990

K-8 EXPORT ORDERS
(at May 2006)

Country	Qty
Egypt	80
Ghana	4
Morocco	2 ³
Myanmar	12 ¹
Namibia	12
Pakistan	39
Sri Lanka	9
Zambia	8 ²
Zimbabwe	12
Undisclosed	8
Total	184+

¹ Reported total requirement for 30

² Reported option for further 8

³ To replace approximately 14 Cessna T-37Bs; total has been reported as 20, but deliveries not confirmed

two-screen 'glass cockpit'. AFPLA originally had requirement for several hundred, of which 25 to 30 delivered by late 1999 and at least 40 confirmed by late 2003; equip at least No. 4 Flying Training School at Shijiazhuang and No. 13 FTS; AFPLA now widely reported to have abandoned plans for full adoption but Navy's Air Academy partly equipped by 2006; aircraft in blue and white colours. Myanmar Air Force last three of 12 delivered in September 1999. Zambian Air Force eight, and Namibian Air Force first four, also delivered in 1999. Three of Sri Lanka six (No. 14 Squadron) destroyed in Tamil Tiger attack on Katunayake AB, 24 July 2001; three replacements delivered 25 July 2005. Six of Zimbabwean 12 delivered by April 2005. Egyptian Air Force had received about 45 (of 80) of K-8E version by late 2002, to replace Aero L-29. Interest also reported from Bangladesh, Cambodia, Eritrea, Laos and Thailand.

COSTS: USD3 million to USD3.5 million flyaway (1996) with TFE731 and Western avionics. Egyptian Air Force (80 aircraft) contract USD347.4 million (1999).

DESIGN FEATURES: Intended for full basic flying training plus parts of primary and advanced syllabi, but capable also of light ground attack missions. Sweptback vertical/non-swept horizontal tail surfaces.

Tapered low wings, with NACA 64A-114 (mod) root and NACA 64A-412 tip sections; sweepback 2° 13' 8" at quarter-chord, 1° 30' incidence at root, 3° dihedral from roots; -2° twist.

FLYING CONTROLS: Conventional and power-assisted; ailerons have hydraulic boost and artificial feel; variable incidence tailplane; electrically operated trim tab in rudder and port

elevator. Aileron travel ±18°, elevators 16° up/28° down, rudder ±28°. Two-position Fowler flaps (23° for T-O, 35° for landing), and split airbrake under fuselage just aft of mainwheel doors, are hydraulically actuated.

STRUCTURE: All-metal damage-tolerant main structure; ailerons of honeycomb; fin and rudder of composites (aluminium on PAC-built aircraft). Service life 8,000 hours. PAC share (initially only tailplane and elevators) increased to include fin, rudder, rear fuselage and engine cowlings/access panels. First Pakistan-built subassemblies delivered to China in mid-1997; planned output by PAC of 12 tail units and three front fuselages in 2001; 24 and 12 respectively in 2002; 36 tails and undecided number of front fuselages in 2003. However, first PAC-built front fuselage not handed over until 5 November 2002, at which time two more under construction.

LANDING GEAR: Hydraulically retractable tricycle type, with single wheel and oleo-pneumatic shock-absorber on each unit. Main units retract inward into underside of fuselage; nosewheel, which has hydraulic steering, retracts forward. Mainwheel tyres size 561x169, pressure 6.90 bar (100 lb/sq in). Chinese hydraulic disc brakes. Anti-skid units. Minimum ground turning radius 6.69 m (21 ft 11½ in).

POWER PLANT: Including prototypes, all except JL-8 have one 16.01 kN (3,600 lb st) Honeywell TFE731-2A-2A turbofan with Lucas Aerospace FADEC, mounted in rear fuselage. Production JL-8 for China powered by 16.87 kN (3,792 lb st) ZMKB Progress AI-25TLK turbofan, ordered in 1997; initial batch of 58 imported; further 42 being negotiated in 2004.

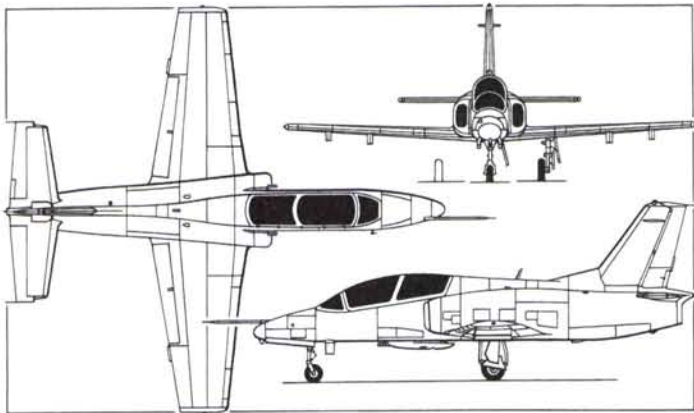
Fuel in two flexible tanks and one inverted flight tank in fuselage and one integral tank in wing centre-section, combined capacity 1,000 litres (264 US gallons; 220 Imp gallons); single refuelling point in fuselage. Provision for carrying one 250 litre (66.0 US gallon; 55.0 Imp gallon) drop tank on outboard pylon under each wing. Oil capacity 4 kg (8.8 lb).

ACCOMMODATION: Instructor and pupil in tandem, on Jiangnan TY7A zero/zero ejection seats (Martin-Baker Mk 10L in Pakistan aircraft); rear seat elevated 28 cm (11 in). One-piece wraparound windscreen; two-piece canopy opens sideways to starboard. Cockpits pressurised and air conditioned.

SYSTEMS: Honeywell ECS 51833 air conditioning and pressurisation system, with maximum differential of 0.27 bar (3.9 lb/sq in). Hydraulic system, pressure 207 bar (3,000 lb/sq in), for operation of landing gear extension/retraction, wing flaps, airbrake, aileron boost, nosewheel steering and wheel brakes. Flow rate 15 litres (3.96 US gallons; 3.30 Imp gallons)/min, with air-pressurised reservoir, plus emergency back-up hydraulic system. Abex AP09V-8-01 pump. Electrical systems powered by 12 kW, 28.5 V DC generator (primary) and 24 V DC (auxiliary), with 115/26 V single-phase AC and 36 V three-phase AC available from 40 Ah Ni/Cd battery and two static inverters, both at 400 Hz. Liquid oxygen system for occupants. Demisting of cockpit transparencies.

AVIONICS: Comms: Bendix/King KTR 908 VHF or KTR 909 UHF; intercom; FJ-20 flight data recorder.

Flight: Bendix/King KNR 634A VOR/glideslope/MKR with KA 26 beacon receiver, ADF 462, Type 265 radio altimeter, HZX-4A AHRS, SS/SC-5 air data computer and KTU 709 Tacan or WL-7A radio compass.



JL-8/K-8 jet trainer and light attack aircraft (Mike Keep) 1158574

Instrumentation: Rockwell Collins EFIS-86T in first 100 aircraft, incorporating CRT primary flight and navigation displays for each crew member plus dual display processing units and selector panels for tandem operation. Blind-flying instrumentation standard. Standby flight instruments include ASI, rate of climb indicator, barometric altimeter, emergency horizon and standby compass.

Chinese (Sicong Group) upgrade for domestic and export aircraft expected to enter production in 2005, includes one HUD, three multifunction display systems (MDS), mission computer, digital video recorder, up-front control panel and data transfer card. Systems, which began testing in September 2004, said to include GPS, Tacan and radio compass navigation, and to function as a fire-control system for 23 mm gun, PL-5E AAM, 57 mm rockets and other weapons.

ARMAMENT (optional): One 23 mm gun pod under centre-fuselage; self-computing optical gunsight in cockpit, plus gun camera. Two external stores points under each wing. Twin ejector racks on inboard stations can carry total of four 6, 11.5 or 50 kg practice bombs; single-store outboard stations can each carry a PL-5E air-to-air missile, a 12-round pod of 57 mm rockets, a 200 kg, 250 kg or BL755 bomb, or a drop fuel tank.

DIMENSIONS, EXTERNAL:

Wing span	9.63 m (31 ft 7¼ in)
Wing mean aerodynamic chord	1.85 m (6 ft 0¾ in)
Wing aspect ratio	5.4
Length overall: incl nose pitot	11.60 m (38 ft 0¾ in)
excl nose pitot	10.40 m (34 ft 1½ in)
Height overall	4.21 m (13 ft 9¾ in)
Elevator span	4.20 m (13 ft 9½ in)
Wheel track	2.54 m (8 ft 4 in)
Wheelbase	4.44 m (14 ft 6¾ in)

AREAS:

Wings, gross	17.02 m² (183.2 sq ft)
Ailerons (total, incl tab)	1.095 m² (11.80 sq ft)
Trailing-edge flaps (total)	2.65 m² (28.55 sq ft)
Fin	1.92 m² (20.67 sq ft)
Rudder, incl tab	1.115 m² (12.02 sq ft)
Tailplane	2.84 m² (30.57 sq ft)
Elevators (total, incl tab)	1.32 m² (14.21 sq ft)

WEIGHTS AND LOADINGS:

Weight empty, equipped	2,757 kg (6,078 lb)
Max fuel: internal	780 kg (1,720 lb)
external (two drop tanks)	388 kg (855 lb)
Max external stores load	943 kg (2,080 lb)
T-O weight: clean	3,700 kg (8,157 lb)
with two 250 litre drop tanks	4,204 kg (9,268 lb)
Max T-O weight with external stores	4,332 kg (9,550 lb)
Max wing loading	254.5 kg/m² (52.13 lb/sq ft)
Max power loading (TFE731)	271 kg/kN (2.65 lb/lb st)

PERFORMANCE (at clean T-O weight):

Never-exceed speed (VNE)	512 kt (950 km/h; 590 mph) IAS
Max level speed at S/L	432 kt (800 km/h; 497 mph)
Unstick speed	100 kt (185 km/h; 115 mph)
Approach speed	108 kt (200 km/h; 124 mph)
Touchdown speed, 35° flap	86 kt (160 km/h; 99 mph)
Stalling speed, 35° flap	81 kt (150 km/h; 94 mph)
Max rate of climb at S/L	1,800 m (5,905 ft)/min
Service ceiling	13,600 m (44,620 ft)
T-O run	440 m (1,445 ft)
T-O to 15 m (50 ft)	600 m (1,970 ft)
Landing from 15 m (50 ft)	518 m (1,700 ft)
Landing run	530 m (1,740 ft)
Range:	
max internal fuel	842 n miles (1,560 km; 969 miles)
max internal/external fuel	1,155 n miles (2,140 km; 1,329 miles)
Endurance: max internal fuel	3 h 12 min
max internal/external fuel	4 h 12 min
g limits (clean)	+7.33/-3.0

HAIC L-15

English name: Flying Lion

TYPE: Advanced jet trainer/light attack jet.

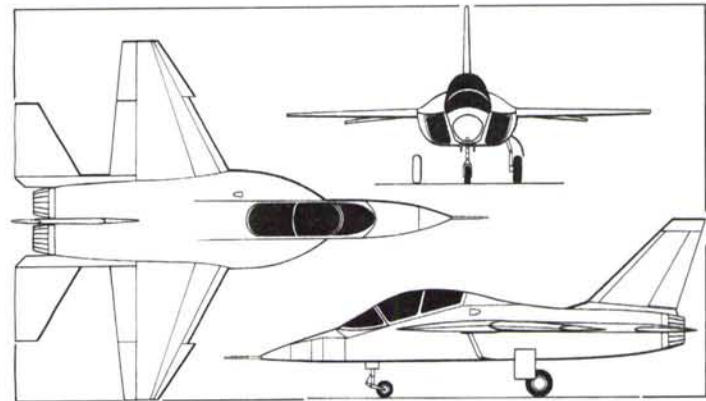
PROGRAMME: Revealed as feasibility study at Aviation Expo 2001, Beijing, September 2001 and displayed in model form at Zhuhai November 2002. International partner(s) sought. Parallel design study undertaken by Yakovlev OKB, revealed at MAKS air show in August 2003 and due to be presented to AVIC II by end of that year. However, by September 2003, when details of the L-15 were again made available at an air show in Beijing, the aircraft's appearance had changed significantly, becoming more like the Yak-130, especially in profile. Yakovlev confirmed in mid-2004 that collaboration on the L-15 was continuing. Three prototypes planned, of which first fuselage delivered 14 August 2005; rolled out 23 September 2005; maiden flight 13 March 2006. Competing with GAIC FTC-2000 for selection as supersonic trainer for J-10 and J-11.



L-15 front cockpit with up-front control panel 1158004



Twin MFDs in L-15 rear cockpit 1158001



HAIC L-15 general arrangement (2004 configuration) (James Goulding) 1158106

DESIGN FEATURES: Shoulder-mounted wings with curved, leading-edge wingroot strakes; dog-tooth leading-edge with two-section manoeuvring slats on entire leading-edge; tandem cockpits; twin engines; single vertical fin. High AoA manoeuvring capability (more than 30° estimated). Service life 10,000 hours or 30 years.

Following details provisional:
FLYING CONTROLS: Three-axis, quad-redundant digital fly-by-wire. All-moving tailplane. Large, door-type dorsal airbrake.

POWER PLANT: Twin 20.6 kN (4,630 lb st with afterburning) ZMKB Progress AI-222K-25F or 17.0 kN (3,825 lb st) class SAEC WS11 turbofans originally proposed. AI-222 reportedly selected in November 2004, but latest (February 2006) literature quotes PS/ZMK DV-2 as alternative.

ACCOMMODATION: Two zero/zero ejection seats in tandem. One-piece canopy, opening sideways to starboard.

AVIONICS: HOTAS controls, HUD, up-front control panel and two MFDs; stores management system.

DIMENSIONS, EXTERNAL:

Wing span	9.48 m (31 ft 1¼ in)
Length overall	12.27 m (40 ft 3 in)
Height overall	4.81 m (15 ft 9¾ in)

WEIGHTS AND LOADINGS:

Normal T-O weight, clean	6,800 kg (14,991 lb)
Max T-O weight	9,800 kg (21,605 lb)



HAIC L-15 prototype after repainting

1158103



Touchdown by HAIC L-15 prototype

1158105



Prototype HAIC L-15

1158104

PERFORMANCE (estimated):

Max level speed	 more than M1.4
Rate of climb at S/L: at MTOW	 9,000 m (29,530 ft)/min
with 50% internal fuel	 15,000 m (49,200 ft)/min
Service ceiling	 16,500 m (54,130 ft)
Max (self-ferry) range	 1,673 n miles (3,100 km; 1,926 miles)
g limits	 +8/-3

HAIC N-5

Chinese name: Nongye Feiji 5 (Agricultural aircraft 5)

TYPE: Agricultural sprayer.

PROGRAMME: Design began November 1987; first details revealed at Farnborough Air Show September 1988; first of three prototypes (B-501L) made first flight 26 December 1989; CAAC type certificate awarded July 1992 and production certificate June 1995. Marketing in Canada under name AG Dragon in late 1990s failed to materialise. At least nine N-5As in operation in China in 2001.

A report from Beijing in mid-2004 indicated that Hongdu had begun ground testing of an upgraded version of the (formerly NAMC) N-5A, designated N-5B and powered by either an Orenda piston engine or a Walter turboprop. First flight was then targeted for March 2005, though it had not been reported by early 2006. Improvements expected from the re-engining include an increased payload of 1,500 kg (3,307 lb) and a service ceiling of 8,000 m (26,250 ft). Although little evidence has been seen of much production of the Lycoming-engined N-5A, the same report declared that this version "will continue to be manufactured".

A model of the N-5B displayed at Airshow China, Zhuhai, in November 2006 showed the N-5B to have been reconfigured to a tailwheel-type landing gear.

CURRENT VERSIONS: **N-5A:** Initial production version; 298 kW (400 hp) Textron Lycoming IO-720-D1B flat-six engine; fixed, tricycle type landing gear. Current status uncertain; last described in 2002-03 *Jane's All the World's Aircraft*.



November 2006 display model of the turboprop-powered, tailwheel-gear N-5B (Robert Hewson)

1040446

N-5B: Turboprop-powered, tailwheel-gear current version; main differences from N-5A as described below.

LANDING GEAR: Tailwheel type; fixed.

POWER PLANT: One 579 kW (777 shp) Walter M 601F turboprop; three-blade variable-pitch propeller.

DIMENSIONS, EXTERNAL:

Wing span	 13.295 m (43 ft 7½ in)
Length overall (flying attitude)	 10.485 m (34 ft 4¾ in)
Height overall	 3.88 m (12 ft 8¾ in)
Wheel track	 3.53 m (11 ft 7 in)

DIMENSIONS, INTERNAL:

Hopper capacity	 1.60 m³ (56.5 cu ft)
-----------------	----------------------------

WEIGHTS AND LOADINGS:

Max payload	 1,500 kg (3,307 lb)
-------------	---------------------------

PERFORMANCE:

Max level speed	 128 kt (237 km/h; 147 mph)
Stalling speed, flaps down	 60 kt (111 km/h; 69 mph)
Max rate of climb at S/L	 360 m (1,181 ft)/min
Service ceiling	 6,000 m (19,680 ft)
T-O run	 251 m (825 ft)
Landing run	 198 m (650 ft)
Chemical dispersal: liquid	 5 kg/m² (1.02 lb/sq ft)
granular	 15 kg/m² (3.07 lb/sq ft)
Max range	 545 n miles (1,010 km; 627 miles)
Endurance	 6 h

HAIG

HARBIN AIRCRAFT INDUSTRIES GROUP (HARBIN FEIJI GONGYE GONGSI) (SUBSIDIARY OF AVIC II)

15 Youxie Street, Pingfang District, PO Box 201-29, Harbin, Heilongjiang 150066

Tel: (+86 451) 650 11 22

Fax: (+86 451) 650 22 73

PRESIDENT AND GENERAL MANAGER: Cui Xuewen

VICE-PRESIDENT: Xu Zhanbin

PUBLIC RELATIONS: Chen Xiaoyi

SUBSIDIARY:

Harbin Embraer Aircraft Industry Company (HEAI)

PRESIDENT: Roberto Rossi

VICE-CHAIRMAN: Guan Dongyuan

GENERAL MANAGER: Marcelo Ramon Ferroni

HAIG at Harbin is the parent organisation of Hafei Aviation Industry Company. It has overall responsibility for HAI's participation in the Eurocopter EC 120 programme, which is assembled in China from imported kits under the local designation HC 120. Harbin is also now involved in the prospective Eurocopter EC 175 (Chinese designation Z-15).

Contract, signed 2 December 2002, to create new company (Harbin Embraer Aircraft Industry Co Ltd: HEAI) for co-production of ERJ-145 regional jet; Embraer 51 per cent holding, HAIG and HAI 24.5 per cent each; workforce 180 at 18 January 2006. Embraer investing USD25 million in new 24,000 m² (258,330 sq ft) production facility for ERJ-145 programme; ERJ-135/140 could also be built. Facility inaugurated August 2003. Initially, Harbin contributes parts manufacture only, importing Brazilian-built major subassemblies for mating in China. Starting with fuselage frames, gradual progress is to be made towards more substantial component manufacture.

Launch order for six from China Southern Airlines, delivered between June 2004 and January 2005. Second customer is China Eastern Airlines, which ordered five ERJ-145s in March 2005, with deliveries starting 29 August 2005. Refer to table of production. Eventual capacity for 24 aircraft per year.



Chinese-built Embraer ERJ-145LI B-3066

1153804

CHINESE ERJ-145 PRODUCTION

c/n	Registration	Type	Delivered	Customer	Remarks
	Brazilian	Chinese			
145701	PT-SGF	B-3060	ERJ-145LI	China Southern	First flight 16 Dec 03
145755	PT-SNA	B-3061	ERJ-145LI	China Southern	
145781	PT-SNB	B-3062	ERJ-145LI	China Southern	
14500804		B-3063	ERJ-145LI	China Southern	
14500815		B-3065	ERJ-145LI	China Southern	
14500823	PT-SXL	B-3066	ERJ-145LI	China Southern	
14500839	PT-SOA	B-3049	ERJ-145LI	China Eastern (Jiangsu)	
14500848	PT-SOB?	B-3050	ERJ-145LI	China Eastern (Jiangsu)	
14500882	PT-SOC	B-3053	ERJ-145LI	China Eastern (Jiangsu)	
14500898	PT-SOD	B-3051	ERJ-145LI		
14500905	PT-SOE	B-3052	ERJ-145LI		
14500921			ERJ-145LI		
14500928			ERJ-145LI	China Eastern (Jiangsu)	
14500932			ERJ-145LI		
			ERJ-145LR		
			ERJ-145LR	Due Nov 06	China Eastern (Wuhan)
			ERJ-145LR		China Eastern (Wuhan)
			ERJ-145LR		China Eastern (Wuhan)
			ERJ-145LR		China Eastern (Wuhan)
			ERJ-145LR	Due Jan 07	China Eastern (Wuhan)

HMDH

HONGDU MD HELICOPTERS

Nanchang, Jiangxi

CEO: Albert H Haider

New joint venture created in early 2003 by RDM Holdings (60 per cent) and Hongdu Aviation Industries Group (40 per cent), with initial USD10 million investment by RDM, under which HMDH assembles MD 500 and 600 series helicopters from US-supplied kits, first of which

were delivered in March 2003. Programme launch planned for October 2003, with three MD 500s and one MD 600 to be completed by year-end. Initial commitments for about 30 helicopters reported by that time. However first locally assembled helicopter, an MD 600N, was shown at Zhuhai in November 2004, having apparently been completed only in the preceding month. One each of MD 500E, 530F, 520N then said to be due for completion within next few months, but not confirmed by early 2006.

At its formation, HMDH had received commitments from local law enforcement and tourist agencies. Future plans envisage gradual progression towards an increased share in the manufacturing process.

HTATC

HUZHOU TAIXIANG AVIATION TECHNOLOGY COMPANY

Huzhou, Zhejiang

Company formed 29 November 2001 as joint venture between Jinjiang Medicine Company and Aitas Enterprise Corporation of USA with total investment of USD29.9 million and

registered capital of USD20 million. Is assembling ASII (Sportscopier) Ultraspot, Rotorway Exec, a three-seat helicopter and an unspecified fixed-wing aircraft from imported kits. First deliveries (five aircraft, including one Ultraspot and one Exec) made in September 2002. HTATC aimed to achieve output of 150 in its first two years of operation and full local manufacture, except for engines, by end of third year. No progress has been reported since 2002, although an 'ultralight helicopter UAV' bearing some resemblance to the ASII Ultraspot was exhibited at Airshow China, Zhuhai, in November 2006.

NLA

NANJING LIGHT AIRCRAFT COMPANY

Room 102, Building D, 29 Yudao Street, Nanjing, Jiangsu 210016
Tel: (+86 25) 489 16 36 and 489 36 55
Fax: (+86 25) 489 16 37
e-mail: njqf@pub.jlonline.com
PRESIDENT: Wo Dingzhu
VICE-GENERAL ENGINEER: Pan Jia Zheng

NLA was created in 1998 by Nanjing University of Aeronautics and Astronautics (NUAA), the municipality of Nanjing, the provincial government of Jiangsu and other business interests. It has its headquarters on the NUAA campus and is responsible for the five-seat AC-500, which made its first flight in May 2004.

NLA AC-500 AIR CAR

Alternative name: Air Sedan

TYPE: Five-seat lightplane.

PROGRAMME: Revealed at Airshow China in November 1998; chief designer Pan Jia Zheng; joint development by NUAA and NLA. Prototype originally targeted to fly in 2000; built and rolled out at HAIG plant, Nanchang, in third quarter of 2000 and exhibited at Airshow China in November 2000. Maiden flight not achieved until May 2004 at the No. 320 Plant in Nanchang. Three examples completed at that time; a second aircraft (c/n 0004) flew for the first time on 3 December 2004 (official first flight on 7 December), this being in trainer configuration, equipped with dual controls. Aircraft B-660L and B-662L have been noted. FAR Pt 23 certification is intended; national certification trials conducted between 4 and 8 December 2005; total 181 sorties; production was due to have begun in March 2006.

CUSTOMERS: Total 22 ordered by individual customers in Wenzhou in 2005.

COSTS: CNY3.6 million; export USD500,000 (2006).

DESIGN FEATURES: General appearance similar to that of Piper and Socata types in same weight/performance category. Constant-chord, low-mounted wings with upturned tips; sweptback vertical tail and small underfin.

Said to be intended mainly for business flights by senior government and industry officials; and for forestry protection, mail delivery, agricultural, environmental monitoring, remote sensing and other activities. Design life 16,000 hours and 65,000 landings.

FLYING CONTROLS: Conventional and manual; flaps fitted. One-piece horn-balanced elevator; ground-adjustable tab on rudder.

STRUCTURE: All-metal main structure; some non-load-bearing components manufactured from composites.

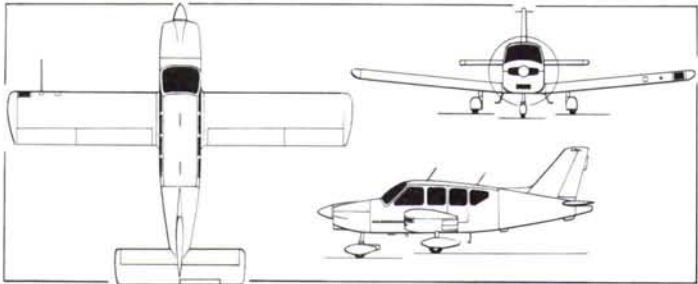
LANDING GEAR: Tricycle type; fixed. Single wheel on each unit.

POWER PLANT: One 194 kW (260 hp) Textron Lycoming IO-540 flat-six engine, driving a Hartzell three-blade propeller. (Teledyne Continental in prototype, according to one report.) Quoted in 2005 as 224 kW (300 hp) engine of unspecified type.

ACCOMMODATION: Pilot and co-pilot or passenger in front, with two rearward-facing seats behind and a forward-facing single seat aft of these. Crew door each side of cockpit, plus passenger door aft of wing on port side.

DIMENSIONS, EXTERNAL:

Wing span 10.20 m (33 ft 5½ in)
Length overall 8.40 m (27 ft 6¾ in)
Fuselage max width 1.20 m (3 ft 11¼ in)



NLA AC-500 light aircraft (James Goulding)

0126689



NLA AC-500 Air Car No. 4, second to fly (NUAA)

1153751

Height overall	3.20 m (10 ft 6 in)
Wheel track	2.80 m (9 ft 2¼ in)
Wheelbase	2.18 m (7 ft 1½ in)
Propeller diameter	1.96 m (6 ft 5 in)
WEIGHTS AND LOADINGS:	
Weight empty	1,117 kg (2,463 lb)
Max baggage weight	65 kg (143 lb)
T-O weight	1,540 kg (3,395 lb)
Max power loading	7.95 kg/kW (13.06 lb/hp)
PERFORMANCE (estimated):	
Max level speed	156 kt (289 km/h; 179 mph)
Max cruising speed	135 kt (250 km/h; 155 mph)
Stalling speed	60 kt (110 km/h; 69 mph)
Service ceiling	5,500 m (18,040 ft)
Landing run	300 m (985 ft)
Range	540 n miles (1,000 km; 621 miles)
Endurance	4 h

SAC (SHAANXI)

SHAANXI AIRCRAFT COMPANY
(SHAANXI FEIJI GONGSI)
(SUBSIDIARY OF AVIC II)

PO Box 34, Hanzhong, Shaanxi 723213
Tel: (+86 916) 288 62 71 and 288 52 72
Fax: (+86 916) 288 61 82 and 288 51 82
e-mail: sac@shanfei.com
Web: www.shanfei.com
PRESIDENT: Hu Xiaofeng
PRESIDENT: Bai Songbai
MARKETING MANAGER: Li Yousen

Founded by executive order of November 1969; occupies a 300 ha (741 acre) site and had 2003 workforce of more than 10,000; covered workspace includes largest final assembly building in China. Status raised to Industry Group in 2001. Main aircraft programme, recently receiving increased development/upgrading effort, is Y-8 transport: non-aerospace products include coaches and small trucks.

SAC Y-8

Chinese name: Yunshuji-8 (Transport aircraft 8)

TYPE: Medium transport/multirole.

PROGRAMME: Redesign, as Chinese development of Antonov An-12B, started at Xian March 1969; first flight of first (Xian-built) prototype 25 December 1974, followed by second (c/n 001802, first built by SAC) 29 December 1975; production go-ahead given 11 February 1980; certified 28 December 1989. Pressurised Y-8C made first flight 17 December 1990. Production rate was approximately five per year during first half of 1990s; new (mainly freighter) designations introduced with Y-8F100 and F200 from 1997; further F-prefixed variants revealed November 2000, reflecting current manufacturing standard; three-person



Y-8F200 four-turboprop medium transport

1151049

flight crews resulting from use of modernised avionics; now seen to have more future in cargo and military roles. Antonov design input acknowledged in recent special missions testbeds.

CURRENT VERSIONS: Y-8: Prototype and baseline military transport.

Y-8A: Helicopter carrier. Main cabin height increased by 120 mm (4.72 in) by deleting internal gantry; downward-opening rear ramp/door, as in Y-8C. Deliveries began 1987. In service.

Y-8B: Mainly unpressurised civil transport. First deliveries 1986; CAAC certification 1993. Military equipment deleted; empty weight reduced by 1,720 kg (3,792 lb); some avionics differ. In service.

Y-8C: First fully pressurised version, developed with Lockheed collaboration. Changes included redesigned (downward-opening ramp-type) cargo loading door and main landing gear; handling system for standard freight containers and pallets; improved com/nav/ATC equipment, air conditioning and oxygen systems; additional emergency exits. First flight 17 December 1990 (SAC 182, converted from first Shaanxi prototype); CAAC certification 1993. Five delivered by January 1994; apparently superseded by Y-8F200/F400.

Y-8CB: CFTE testbed; see entry for Y-8/Y-9 Special Mission versions.

Y-8D: Export baseline version, with main avionics by Rockwell Collins and Litton. Later versions designated Y-8D II. Deliveries began 1987 (Y-8D) and 1992 (Y-8D II); eight delivered by early 1997; none reported since then.

Y-8 (DZ): Special mission version; described separately.

Y-8E: Drone carrier version of baseline Y-8 for WZ-5 Chang Hong (Long Rainbow) UAV. Forward pressure cabin accommodates drone controller's console; carrier/launch trapeze for one UAV under each outer wing panel. First flight 1989; first deliveries later that year, replacing obsolete Tu-4s. In service.

Y-8F: Livestock carrier version of baseline Y-8, with cages to hold up to 500 sheep or goats. First flight early 1990; first deliveries later that year; CAAC type approval 25 December 1993. In service.

Y-8F100: Upgraded cargo version. Modernised avionics (colour weather radar, EFIS, VOR/ILS, DME, GPS navigation, FDR, HF and VHF radios and ATC transponder) and redesigned loading system. Launch customer China Postal Airlines (three); delivered 11 May 1996 with WJ6A engines. Crew of five. Now the baseline part-unpressurised version.

Y-8F200: Pressurised version of F100, certified by CAAC 17 November 1997. Increased internal passenger/cargo volume. Two delivered to Tanzanian Air Force 26 October 2003. Detailed description applies to F-100/200 unless otherwise indicated.

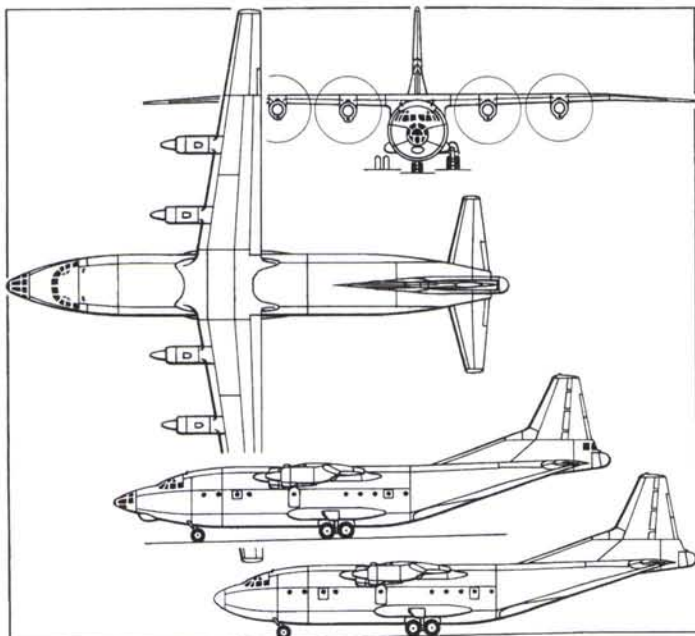
Y-8F300: Freighter. Generally as Y-8F100, but with shorter fuselage, 'solid' nose and reduced (three-person) flight crew. Not currently being promoted.

Y-8F400: Pressurised freighter. Generally as Y-8F200, but with shorter fuselage, 'solid' nose and reduced (three-person) flight crew. Maiden flight 25 August 2001; certified by CAAC 26 August 2002; passed acceptance review 27 November 2002. China Postal Airlines suggested as possible launch customer. Said to be scheduled for refit with PW150A engines.



Model of the solid-nosed Y-8F400 freighter (Robert Hewson)

0547123



SAC Y-8 four-turboprop multipurpose transport, with additional side view (bottom) of F300/400 freighter (Mike Keep)

1159096

Y-8F600: Further Westernised, shorter fuselage, 'solid'-nosed pressurised freighter version, with Pratt & Whitney Canada PW150B turboprops and Dowty R408 six-blade composites propellers, Honeywell Primus Epic avionics suite, two-person flight crew; Smiths Aerospace integrated standby instrument system (ISIS); otherwise generally similar to Y-8F400. Development approved by Defence and Industry Commission November 2001; co-development agreement with Antonov design bureau 4 November 2002. Two under construction late 2000; first flight originally expected by end of 2001, but first engine deliveries not made until late 2005. According to SAC President at November 2004 Airshow China, was then 'on schedule' to fly in July 2005, with certification targeted for 2006. However, by September 2005 company spokesman indicated one-year programme stretch, with first flight and certification/service entry re-targeted for 2006 and 2007 respectively due to preoccupation with 'other projects' (see separate entry for Special Missions versions). Most recent estimate (by SAC Vice-President in November 2006, at which time F600 was in final assembly) was that maiden flight would take place in January or February 2007, with certification by end of that year.

Y-8F800: Early designation quoted for what later became known as Y8-X and in 2005 as Y-9 (which see).

Y-8H: Special mission version; *described separately*.

Y-8J: Special mission version; *described separately*.

Y-8X: Special mission version; *described separately*.

Y8-X: Designation (2002) for much-enhanced derivative; redesignated Y-9 in 2005; *described separately*.

CUSTOMERS: Total of about 90, including exports, reportedly delivered (of which 50 can be confirmed) by late 2002. In service in China with China Postal Airlines (five Y-8F100s delivered from 11 May 1996) and PLA Air Force (AFPLA); eight military exports (Y-8D) to air forces of Myanmar (four, of which first two delivered 14 July 1994), Sri Lanka (three, of which first two delivered 9 December 1987) and Sudan (two delivered 2 and 13 November 1991). First two Sri Lankan aircraft modified locally for use as bombers (both since lost). Two (Y-8F100) leased to BonAir of Iran from 14 March 1998; two (Y-8F200) exported to Tanzania 26 October 2003. Reported receipt of letters of intent for 36 Y-8F600s from Chinese airlines (including China Postal, five) by August 2005, at which time military exports also being negotiated.

DESIGN FEATURES: High-mounted wing; circular-section fuselage (forward section and tail turret pressurised), upswept at rear; angular tail surfaces with large dorsal fin. More pointed nose transparencies than An-12, probably from Chinese H-6 (Tu-16) production; shorter, 'solid' nose replaces this glazing in F300/400/600.

Wing sections C-5-18 at root, C-3-16 at rib 15 and C-3-14 at tip, final two digits indicating thickness/chord ratio; incidence 4°; 1° dihedral on intermediate panels, 4° anhedral on outboard panels; 6° 50' sweepback at quarter-chord; fixed-incidence tailplane. **FLYING CONTROLS:** Conventional and manual. Aerodynamically balanced differential ailerons, elevators and rudder, each of which has inset trim tab; two-segment, hydraulically actuated double-slotted Fowler flaps on each wing trailing-edge; comb-shaped spoilers forward of flaps.

STRUCTURE: All-metal (aluminium alloy) conventional semi-monocoque/stressed skin; wings, tailplane and fin are all two-spar box structures; landing gear and all hydraulic components manufactured by Shaanxi Aero-Hydraulic Component Factory (SAHCF).

LANDING GEAR: Hydraulically retractable tricycle type, with Shaanxi (SAHCF) nitrogen/oil shock-struts on all units. Four-wheel main bogie on each side retracts inward and upward into blister on side of fuselage. Twin-wheel nose unit, hydraulically steerable to ±35°, retracts rearward. Mainwheel tyres size 1,050×300, pressure 28.40 bar (412 lb/sq in); nosewheel tyres size 900×300, pressure 16.70 bar (242 lb/sq in). Hydraulic disc brakes and Xingping inertial anti-skid sensor. Minimum ground turning radius 13.75 m (45 ft 1½ in).

POWER PLANT: *Except F600:* Four 3,126 kW (4,192 shp) SAEC (Zhuzhou) WJ6A turboprops, each driving a Baoding four-blade J17-G13 constant-speed fully feathering propeller.

F600: Four 3,781 kW (5,071 shp) Pratt & Whitney Canada PW 150B turboprops, each driving a Dowty six-blade all-composites propeller.

All fuel (F100/F300) in two integral tanks and 29 bag-type tanks in wings (20,102 litres; 5,310.5 US gallons; 4,422 Imp gallons) and fuselage (10,075 litres; 2,661.5 US gallons; 2,216 Imp gallons), giving total capacity of 30,177 litres (7,971.5 US gallons; 6,638 Imp gallons). Reduced fuel load in F200/F400 (see under Weights and Loadings). Refuelling points in starboard side of fuselage (between frames 14 and 15), mainwheel fairing, and in wing upper surface.

ACCOMMODATION: Flight crew of five (pilot, co-pilot, navigator, engineer and radio operator) in early versions and F100/F200; three crew only in F300/F400, two in F600. Forward portion of fuselage in F100/F300 is pressurised, and can accommodate up to 14 passengers in addition to crew. Cargo compartment (between frames 13 and 43) is unpressurised in these versions. Pressurised volume increased in F200/F400; effective length of cargo hold extended internally by 2.00 m (6 ft 6¾ in). Maximum accommodation for up to 96 troops; or 80 paratroops; or up to 92 casualties with three medical attendants; or two 'Liberation' army trucks, plus Jeep-sized vehicle on loading ramp. Drive on/drive off vehicle loading, using auxiliary ramp.

Short-hold freighter versions (Y-8F100 and Y-8F300) can accommodate optimum eight 2.24 × 1.37 m (88 × 54 in), four 2.24 × 2.74 m (88 × 108 in), three 2.44 × 3.18 m (96 × 125 in), or three 88 × 125 in with one 88 × 108 in and one 88 × 54 in standard cargo pallets; or 17 LD3 containers. Larger (Y-8F200 and Y-8F400) hold can accept optimum four 2.24 × 3.18 m (88 × 125 in), four 2.44 × 3.18 m (96 × 125 in) pallets or 19 LD3s. F600 hold capacity, five 96 × 125 or seven 88 × 108 in pallets. Individual cargo items of up to 7,400 kg (16,315 lb) can be airdropped.

Crew door and two emergency exits in forward fuselage. Three additional emergency exits in cargo compartment, access to which is via a large rear-loading ramp/door in underside of rear fuselage.

SYSTEMS: Forward fuselage of F100 pressurised to maintain a differential of 0.20 bar (2.8 lb/sq in) at altitudes above 4,300 m (14,100 ft). (F200/F400/F600 fully pressurised.) Two independent hydraulic systems, with operating pressures of 152 bar (2,200 lb/sq in) (port) and 147 bar (2,130 lb/sq in) (starboard), plus hand and electrical standby pumps, for actuation of landing gear extension/retraction, nosewheel steering, flaps, brakes and rear ramp/door. Electrical DC power (28.5 V) supplied by eight 12 kW generators, an 18 kW (24 hp) Xian Aero Engine Company APU (mainly for engine starting) and four 28 Ah batteries. Four 12 kVA alternators provide 115 V AC power at 400 Hz. Gaseous oxygen system for crew. Electric de-icing of windscreen, propellers and fin/tailplane leading-edges; hot air de-icing for wing leading-edges. WDJ-1 APU.

AVIONICS (Y-8F300/400): *Comms:* Rockwell Collins VHF-42B and HF-9000 com radios and TDR-94 ATC transponder.

Radar: Rockwell Collins TWR-850 colour weather radar.

Flight: Universal Avionics UNS-1K flight management system; Rockwell Collins VOR-432, DME-442, AHS-85E AHSR and EFIS-86E; Honeywell ED-55 flight data recorder.

Instrumentation: Honeywell Mk V nav display.

EQUIPMENT (freighter versions): Electric winch, tow, and 2,300 kg (5,070 lb) capacity hoist for cargo loading and unloading. Roller system for containerised or palletised cargo handling. Cargo tie-downs and barrier net.

DIMENSIONS, EXTERNAL (all versions, except where indicated):

Wing span	38.00 m (124 ft 8 in)
Wing chord: at root	4.73 m (15 ft 6¼ in)
at tip	1.69 m (5 ft 6½ in)
mean aerodynamic	3.45 m (11 ft 3¾ in)
Wing aspect ratio	11.9
Length overall: F100, F200	34.02 m (111 ft 7¼ in)
F300, F400	32.93 m (108 ft 0½ in)
Fuselage max diameter (circular section)	4.10 m (13 ft 5½ in)
Height overall	11.16 m (36 ft 7½ in)
Tailplane span	12.195 m (40 ft 0¼ in)
Wheel track (c/l of shock-struts)	4.92 m (16 ft 1¾ in)
Wheelbase (c/l of main bogies)	9.575 m (31 ft 5 in)
Propeller diameter: except F600	4.50 m (14 ft 9¼ in)
F600	4.115 m (13 ft 6 in)
Propeller ground clearance: except F600	1.89 m (6 ft 2½ in)
Crew door: Height	1.455 m (4 ft 9¼ in)
Width	0.80 m (2 ft 7½ in)

Rear-loading hatch: Length	7.67 m (25 ft 2 in)
Width: min	2.65 m (8 ft 8¼ in)
max	3.10 m (10 ft 2 in)
Emergency exits (each): Height	0.55 m (1 ft 9¾ in)
Width	0.60 m (1 ft 11½ in)

DIMENSIONS, INTERNAL:	
Cabin (incl flight deck, galley and toilet):	
Length: F100, F300	13.70 m (44 ft 11¼ in)
F200, F400	15.70 m (51 ft 6 in)
F600	18.00 m (59 ft 0¾ in)
Width: min	3.00 m (9 ft 10 in)
max	3.50 m (11 ft 5¾ in)
Height: min	2.25 m (7 ft 4½ in)
max	2.60 m (8 ft 6½ in)
Floor area: F100, F300	55.0 m² (592 sq ft)
Volume: F100, F300	123.3 m³ (4,354 cu ft)
F200, F400	137.6 m³ (4,859 cu ft)
F600	170.0 m³ (6,003 cu ft)

AREAS:	
Wings, gross	121.86 m² (1,311.7 sq ft)
Ailerons (total)	7.84 m² (84.39 sq ft)
Trailing-edge flaps (total)	26.91 m² (289.66 sq ft)
Rudder	6.535 m² (70.34 sq ft)
Tailplane	27.05 m² (291.16 sq ft)
Elevators (total)	7.10 m² (76.42 sq ft)

WEIGHTS AND LOADINGS:	
Weight empty, equipped: F100	34,500 kg (76,060 lb)
F200	34,760 kg (76,635 lb)
F400	34,000 kg (74,955 lb)
F600	33,500 kg (73,855 lb)
Max fuel load: F100, F300	22,909 kg (50,505 lb)
F200, F400	14,600 kg (32,187 lb)
F600	19,000 kg (41,888 lb)
Max payload:	
containerised: all versions	15,000 kg (33,069 lb)
bulk cargo: F100, F200, F600	20,000 kg (44,090 lb)
Max airdroppable cargo: total	13,200 kg (29,100 lb)
single piece	7,400 kg (16,315 lb)
Max T-O weight: F100, F200	61,000 kg (134,480 lb)
F600	65,000 kg (143,300 lb)
Max ramp weight: F100, F200	61,500 kg (135,585 lb)
Max landing weight: F100, F200	58,000 kg (127,870 lb)
F600	65,000 kg (143,300 lb)
Max zero-fuel weight:	
F100, F300	55,278 kg (121,865 lb)
F200, F400	55,538 kg (122,440 lb)
Max wing loading: F100, F200	500.6 kg/m² (102.53 lb/sq ft)
F600	533.4 kg/m² (109.25 lb/sq ft)
Max power loading: F100, F200	4.88 kg/kW (8.02 lb/shp)
F600	4.30 kg/kW (7.06 lb/shp)

PERFORMANCE:	
Max level speed at FL230:	
F100, F300	357 kt (662 km/h; 411 mph)
F200, F400	345 kt (640 km/h; 397 mph)
F600	351 kt (650 km/h; 403 mph)
Max cruising speed at FL262:	
except F600	297 kt (550 km/h; 342 mph)
F600	308 kt (570 km/h; 354 mph)
Econ cruising speed at FL262:	
all versions	286 kt (530 km/h; 329 mph)
Unstick speed	129 kt (238 km/h; 148 mph)
Touchdown speed at MLW	130 kt (240 km/h; 150 mph)
Max rate of climb at S/L	473 m (1,552 ft)/min
Rate of climb at S/L, OEI	231 m (758 ft)/min
Service ceiling, A UW of 51,000 kg (112,435 lb):	
F100, F300	10,400 m (34,120 ft)
F200, F400	10,050 m (32,970 ft)
F600	10,300 m (33,800 ft)
Service ceiling, OEI, A UW of 51,000 kg (112,435 lb)	8,100 m (26,580 ft)
Runway ACN	15
T-O run: except F600	1,270 m (4,170 ft)
F600	1,540 m (5,050 ft)
FAR T-O field length	1,900 m (6,235 ft)
T-O to 15 m (50 ft)	3,007 m (9,870 ft)
Landing from 15 m (50 ft) at MLW	2,174 m (7,135 ft)
FAR landing field length	1,650 m (5,415 ft)
Landing run at MLW: except F600	1,058 m (3,475 ft)
F600	1,510 m (4,955 ft)
Range with max payload:	
F100	687 n miles (1,273 km; 791 miles)
F600	1,079 n miles (2,000 km; 1,242 miles)
Range with max fuel:	
F100	3,032 n miles (5,615 km; 3,489 miles)
F200, F400	1,857 n miles (3,440 km; 2,137 miles)
F300	2,861 n miles (5,300 km; 3,293 miles)

SAC Y-8/Y-9 (SPECIAL MISSION VERSIONS)

TYPE: Various.

PROGRAMME: China has for many years sought to develop its maritime surveillance, AEW&C/AWACS and sigint-gathering capability, initially with imported platforms and equipment. Earlier efforts have involved, and still do, modified versions of such aircraft as the Ilyushin Il-76 and Tupolev Tu-154, but increasingly since 2000 use has been made of so-called ‘Y-8 Category III’ airframes as platforms for developing, testing and evaluating new surveillance, early warning and intelligence-gathering systems. Examples seen as of early 2006 are summarised here. At that time, indications were that any such systems selected for service entry would utilise airframes brought up to Y-9 standard; pending clarification, Y-8 designations have been retained in the variant descriptions which follow. Further details of the equipment carried by some of these aircraft can be found in *Jane’s Electronic Mission Aircraft* and/or *Jane’s Radar and Electronic Warfare Systems*.



SAC Y-8 (AWACS version) development aircraft T0518 1158095



SAC Y-8 ‘2504’ (sigint version) with fintip and ventral antennas, faired-in tail turret and cheek radomes 1037985



Presumed sigint SAC Y-8 in primer colours 1158881



SAC Y-8(DZ) AEW version 1037981



SAC Y-8J maritime patrol/AEW version 1037986

CURRENT VERSIONS: **Y-8CB:** Radar and systems testbed (serial 079) used by China Flight Test Establishment (CFTE) at Yanliang; first flight August 1999. Nose adapted for modular installation of various types of fire control radar. Also seen during 2005 testing six-blade propeller (possibly JL-4 destined for Y-8F600 and Y-9) on port inner engine.

Y-8(DZ): Reported designation (*dianzi zhencha*: electronic intelligence) of elint/AEW version (serial number 9361) first seen in Shanghai area in mid-2004. Recognition points include cylindrical wingtip pods, a large chin radome and two dorsal antenna fairings (one above forward fuselage and the other just in front of fin fillet), plus several smaller fairings beneath fuselage and at tip of nose. According to Chinese sources, elint equipment is a CEIEC KZ800 (*kongzhong zaogui*: airborne early warning) system operating in the 1 to



The AWACS Y-8 T0516 viewed from rear, showing added auxiliary fins and other features

1158648



A Y-8X 'under escort' by an F/A-18 Hornet

1151031



Underside view of 'sigint' SAC Y-8

1158882



Y-8F400 phased array radar testbed

1151033



Possible command post Y-8 variant

1151032

18 GHz frequency band and requiring a mission crew of at least three. As of late 2005, this aircraft believed to be still undergoing evaluation by PLA Navy.

Y-8H: Aerial survey version; received CAAC approval 18 June 1992. Believed two built. No other details known.

Y-8J: Believed to be designation of maritime surveillance and AEW version, more capable than Y-8X and first flown (November?) 1998. Two known PLA Navy examples to date (serial numbers 9281 and 9201), one of which reported to have downlinked target information to a ship-based HAI Z-9C ASW helicopter during a late 2000 naval exercise. Nose glazing replaced by bulbous and slightly drooped radome housing 360° scan Skymaster X-band (10 GHz) pulse Doppler radar (range more than 200 n miles; 370 km; 230 miles), about six to eight of which purchased from Racal Defence Electronics (now part of Thales) in 1996.

Y-8X: Maritime patrol version (*trans* surveillance); Litton AN/APC-504(V)3 surface search radar (range 100 n miles; 185 km; 115 miles) in undernose radome. Prototype (B-4101) received type approval 1 September 1985. Possibly four others built (serials 9261, 9271, 9281 and 9291); in service since mid-1980s; most recently noted with North Sea Fleet's 3rd Independent Air Regiment at Laiyang. Limited surveillance capability; 9281 later converted to Y-8J. Details in earlier editions. (Designation reappeared 2002, though

typographically different as Y8-X, for new-generation, enlarged Y-8 derivative, but latter received new identity in September 2005 as Y-9, which see).

Y-8 (phased array radar version): As of early 2006, no Chinese designation had been suggested for this alternative AEW version, at least two examples of which had been noted, each carrying a dorsally mounted, fore and aft 'plank' or 'balance beam' antenna similar in shape and size to that of the Ericsson Erieye radars fitted to some Western surveillance aircraft. First aircraft seen, noted at Hefei in October 2004 and under test at CFTE by year-end, was a converted Y-8F200 airframe, said to have made maiden flight 8 November 2001 and have radar developed by No. 38 Institute.

Second aircraft, based on shorter-fuselage, solid-nosed Y-8F400, has redesigned vertical tail, six-blade propellers, no tail turret and no rear loading ramp; may represent intended production version. Said to have made maiden flight 14 January 2005.

For details of the latest updates to *Jane's All the World's Aircraft* online and to discover the additional information available exclusively to online subscribers please visit
jawa.janes.com

Y-8 (sigint version): First seen during visit to SAC by Chinese Vice-Premier in April 2005. Has redesigned nose with reduced glazing, four-blade propellers and large, bulged, rectangular 'cheek' antenna fairing each side just aft of flight deck windows, in position normally occupied by forward cabin door. Slender box fairing atop the tailfin, possibly housing radar warning receiver.

Y-8 (new EW version): One aircraft (incomplete serial number 20*1*) first seen in vicinity of Nanjing in July 2005. Main external features are canoe-shaped fairing beneath forward fuselage and cluster of smaller blade antennas protruding from underside of (apparently sealed) rear loading ramp. Some reports suggest recent entry into service. Chinese designation not yet known.

Y-8 (AWACS version): Exhibition models depicting a Y-8 AWACS configuration employing a saucer-shaped, strut-mounted dorsal dome antenna housing appeared in the mid-1990s and, more recently (April 2005), with the smaller Y-7 as potential platform aircraft. First sight of a flying example occurred at the CFTE later in 2005, the aircraft being one of the solid-nosed Y-8 variants, most probably an F400. Later images revealed this aircraft to have diamond-shaped auxiliary endplate fins and serial number T0518. Other Chinese-sourced information suggests involvement of No. 14 Institute and/or No. 603 Institute with the radar, the nature of which was still undetermined at the time of closing for press. Dorsal radome may be non-rotating, suggesting instead a three-antenna triangular internal arrangement to provide 360° coverage.

Y-8 (command post (7) version): Exact purpose of this version, first seen in poor-quality and possibly retouched photograph on Chinese Internet in October 2005, was uncertain at time of going to press; a possible submarine communications role has also been suggested. Aircraft has glazed nose with small 'thimble' fairing; hemispherical (possible satcom) fairing atop fuselage immediately aft of wing trailing-edge; four-blade propellers; faired-in tail turret; and fintip box fairing. Some of these features are shared with a Boeing 737-300 (B-4052) recently converted by XAC for C/I duties. According to Jane's sources in early 2006, numerous external HF antennas are "enough.....to support at least 10 airborne controllers".



SAC brochure picture of projected Y-9 1151987

Following (design estimate) details compare current Y-9 proposal with earlier Y8-X concept.

POWER PLANT: Y8-X: Four 4,847 kW (6,500 ehp) turboprops of unspecified type; six-blade composites propellers.

Y-9: Four SAEC (Zhuzhou) 'improved' WJ6C turboprops (rating not stated); six-blade Baoding JL-4 composites propellers.

ACCOMMODATION: Y8-X: Up to 132 paratroops; or eight 3.175 x 2.44 m (125 x 96 in) or nine 2.74 x 2.24 m (108 x 88 in) ISO pallets.

Y-9: Up to 98 paratroops or minor casualties; up to 72 serious casualties plus three medical attendants; equivalent cargo such as vehicles and weapons; or one 6 m, three 4 m or 13 1 m size pallets. Rapid loading/unloading system. Single or multiple airdrops of cargo, including low-altitude extraction. Flight crew of four.

AVIONICS: Advanced com/nav, radar, EFIS, EIS, FMS and GPS/INS.

DIMENSIONS, INTERNAL:

Cabin (Y-9): Length	16.20 m (53 ft 1 3/4 in)
Max width	3.20 m (10 ft 6 in)
Max height	2.35 m (7 ft 8 1/2 in)
Cabin volume: Y8-X	180.0 m ³ (6,357 cu ft)

WEIGHTS AND LOADINGS:

Operating weight empty: Y8-X	39,000 kg (85,980 lb)
Internal fuel weight: Y-9	23,000 kg (50,706 lb)
Normal payload: Y8-X	25,000 kg (55,115 lb)
Y-9	20,000 kg (44,092 lb)
Max payload: Y8-X	30,000 kg (66,139 lb)
Max load for airdrop: Y8-X	20,000 kg (44,092 lb)
Y-9	13,200 kg (29,101 lb)
Max single airdrop load: Y8-X	10,000 kg (22,046 lb)
Y-9	8,200 kg (18,078 lb)
Normal max T-O weight: Y8-X	77,000 kg (169,755 lb)
Y-9	65,000 kg (143,300 lb)
Overload max T-O weight: Y8-X	81,000 kg (178,575 lb)
Max landing weight: Y8-X	77,000 kg (169,755 lb)

PERFORMANCE:

Max level speed: Y8-X	356 kt (660 km/h; 410 mph)
Y-9	351 kt (650 km/h; 403 mph)
Max cruising speed: Y8-X	308 kt (570 km/h; 354 mph)
Y-9	297 kt (550 km/h; 342 mph)
Max operating altitude: Y8-X	9,000 m (29,530 ft)
Y-9	8,000 m (26,250 ft)
Service ceiling: Y8-X	11,500 m (37,730 ft)
Y-9	10,100 m (33,140 ft)
T-O and landing distance: Y-9	1,350 m (4,430 ft)
Range with max payload: Y8-X	1,349 n miles (2,500 km; 1,553 miles)
Y-9	540 n miles (1,000 km; 621 miles)
Range with max fuel: Y8-X	3,606 n miles (6,680 km; 4,150 miles)
Max endurance: Y8-X	12 h

SAC Y-9
Chinese Name: Yunshuji-9 (Transport aircraft 9)

TYPE: Medium transport/multirole.

PROGRAMME: Development (then as Y8-X) reportedly began 2001 as enlarged Y-8 successor; revealed in model form November 2002, with provisional specification, at Airshow China, Zhuhai; design understood to have benefited from SAC/Antonov agreement on Y-8F600 signed at that show. Revised details released at Aviation Expo Beijing in September 2005 revealed design to have been downsized to that of Y-8 and now renamed with previously unused designation Y-9, although still referred to by some Chinese sources as 'Y-8 Category III'.

DESIGN FEATURES: Retains general configuration and structure of Y-8, but with uprated engines, modernised 'glass cockpit' avionics and other improvements. Design lifetime target of 50,000 flight hours, 20,000 sorties or 30 calendar years.



Cutaway model of Y-9 displayed at Dubai air show in late 2005 (Robert Hewson) 1158866

SAC (SHENYANG)

SHENYANG AIRCRAFT CORPORATION
(SHENYANG FEIJI GONGSI)
(SUBSIDIARY OF AVIC I)

1 Lingbei Street, Huanggu District, Shenyang, Liaoning 110034

Tel: (+86 24) 86 89 66 80 and 86 59 92 05

Fax: (+86 24) 86 89 66 89

e-mail: contacts@sac.com.cn

Web: www.sac.com.cn

PRESIDENT: Li Fangyong

Pioneer Chinese fighter design centre, founded 29 June 1951; built 767 examples of J-5 (licence MiG-17F) from 1956-59 and from 1963 was major producer of several thousand of J-6 series (reverse-engineered MiG-19), including 634 JJ-6 tandem-seat fighter trainers; initiated development and early production of J-7 (see under CAC). On 29 June 1994, SAC became core enterprise in newly formed Shenyang Aircraft Industries Group (SAIG). Occupies site area of more than 800 ha (1,976 acres) and has workforce of about 30,000; only some 30 per cent of current activities are in aerospace.

Principal programme is J-8 II/J-8B fighter, currently the subject of various upgrade programmes. Also engaged in major assembly/co-production programme of Sukhoi Su-27 variants as J-11 for PLA Air Force (AFPLA) and Navy. Also responsible for tail units, engine pylons and electrical subassemblies of ACAC ARJ21 regional jet.

Aerospace subcontract manufacture, begun at various dates since 1985, has included doors for Bombardier Dash 8Q, cargo doors for Boeing 757, wing ribs and emergency exits for Airbus A319 and A320, tailcone/landing gear door/pylon components for Lockheed Martin C-130, rear fuselage and tail components for Boeing 737-700, floors and bulkheads for Boeing 747, and other machined parts for BAE, Boeing and EADS. Collaboration with Hellenic Aerospace Industry Ltd announced in February 1997 on formation of Shenyang Hellenic Aircraft Repair Company. Agreement September 2005 with Dutch Stork Aerospace to collaborate in developing and manufacturing commercial aircraft aerostructures.

SAC J-8

Chinese name: Jianjiji-8 (Fighter aircraft 8)

Westernised designation: F-8

NATO reporting name: Finback

TYPE: Multirole fighter.

PROGRAMME: Development of original J-8 (with nose air intake) started 1964; first flight 5 July 1969; initial production authorised July 1979, began December 1979. All-weather J-8 I made maiden flight 24 April 1981 and production approved July 1985; ended 1987 after between 100 and 150 J-8s and J-8 Is.

Present baseline configuration is improved J-8 II (now J-8B 'Finback-B'), on which design work began 1980; maiden flight of first of four prototypes took place 12 June 1984. Peace Pearl programme, to upgrade J-8 II with Western avionics, embargoed by US government mid-1989 and cancelled by China 1990; replaced by alternative domestic upgrade programmes. Trials with some parts of structure covered in Xikai SF18 radar-absorbent material were reported in early 1999.

CURRENT VERSIONS: J-8 ('Finback-A'): Initial clear-weather day fighter. Single-piece forward-opening canopy; simple ranging radar in nose centrebody; single-barrelled gun on each side of nosewheel bay, with PL-2 AAMs on inboard wing pylons and provision for external tanks outboard.

J-8 I ('Finback-A'): Improved (all-weather) version of J-8. Same power plant, but fitted from outset with Sichuan SR-4 fire-control radar in intake centrebody; single twin-barrelled 23 mm cannon on each side of lower front fuselage. Production completed. Approximately 54 in service in mid-2001, by which time apparently redesignated **J-8A**; figure includes some converted to reconnaissance role (see JZ-8 paragraph). Units have included AFPLA 1st and 3rd Regiments of 1st Fighter Division at Anshan; some (including reconnaissance versions) remain in use with 70th Fighter Regiment at Yangkun.

J-8B ('Finback-B'): All weather version (originally J-8 II), some 70 per cent redesigned compared with J-8 I. Main configuration change is to 'solid' nose and twin lateral air intakes, providing more nose space for fire-control radar and other avionics, plus increased airflow for more powerful WP13A II turbojets. Manufactured in small economic batches rather than continuous production.

Late-production ('Block 02') J-8Bs have an upgraded (KLJ-1 ?) fire-control radar with a lookdown/shootdown mode compatible with PL-8 (Python 3) IR-guided and PL-11



SAC J-8Ds wearing new identity markings of 9th Air Division, AFPLA

1128922



Detail of SAC J-8F rear during construction

1128923

F-8 IIM: Upgraded J-8B; outgrowth of earlier proposals for F-8 II export version. Developed primarily for export, but none ordered; however, improvements now being adopted as upgrade for in-service AFPLA J-8Bs. Main differences from J-8B are more powerful engine, improved avionics and modernised cockpit with HOTAS controls. Developed jointly by SAC and Shenyang Aircraft Research Institute (SARI); first flight 31 March 1996, two years after delivery of drawings; flight testing of aircraft and WP13B engine completed 19 January 1998. Second F-8 IIM completed by late 1998. Additional proposed upgrades revealed by then included No. 607 Institute Blue Sky low-altitude navigation pod; Southwest China Electronic Equipment Research Institute KG 300G airborne self-protection jammer pod; No. 613 Institute FLIR/laser targeting pod; and a triple redundant digital fly-by-wire flight control system. These would presumably be similar to the systems quoted for the J-8 II ACT.

CUSTOMERS: PLA Air Force and Navy.

CHINESE J-8 OPERATORS

Service	Air Division	Air Regiment	Base	Variant
PLA AF	1st	3rd	Anshan	J-8F
	2nd	4th	Suixi	J-8B
	9th	27th	Foshan	J-8D
	12th	n/k	Shandong	J-8
	18th	54th	n/k	J-8D
	21st	61st	Mudanjiang	J-8H
	24th	70th ¹	Yangkun	J-8A/E
	24th	71st	Zunhua	J-8
	24th	72nd	Zunhua	J-8A
	26th	76th	Chongming	J-8B
	nil	4th Independent	Yuhong	JZ-8 ²
	nil	15th	Qingdao	J-8A
PLA Navy	9th	25th	Lingshui	J-8B/D

¹ Previously equipped with J-8

² Only first-generation (nose air intake) JZ-8 conversions confirmed

Notes: 30th Air Division (three regiments based on Dandong) has disbanded

DESIGN FEATURES: Extension of late 1950s Soviet heavy fighter theory. Thin-section, mid-mounted delta wings and all-sweptback tail surfaces; fuselage has area rule 'waisting', detachable rear portion for engine access, and dorsal spine fairing. Large ventral fin under rear fuselage, main portion of which folds sideways to starboard during take-off and landing, provides additional directional stability; small fence on each wing upper surface near tip; small air scoops at foot of fin leading-edge and at top of fuselage each side, above tailplane. Sweepback 60° on wing and tailplane leading-edges; wings have slight anhedral.

FLYING CONTROLS: Hydraulically boosted ailerons, rudder and low-set all-moving tailplane; two-segment single-slotted flaps on each wing trailing-edge, inboard of aileron; four door-type underfuselage airbrakes, one under each engine air intake trunk and one immediately aft of each mainwheel well.

STRUCTURE: Conventional aluminium alloy semi-monocoque/stressed skin construction, with high-tensile steel for high load-bearing areas of wings and fuselage and titanium in high-temperature fuselage areas; ailerons, rudder and rear portion of tailplane are of aluminium honeycomb with sheet aluminium skin; dielectric skins on nosecone, tip of main fin, and on non-folding portion of ventral fin leading-edge.

LANDING GEAR: Hydraulically retractable tricycle type, with single wheel and oleo-pneumatic shock-absorber on each unit. Steerable nose unit retracts forward, main units inward into centre-fuselage; mainwheels turn to stow vertically inside fuselage, resulting in slight overwing bulge. Brake-chute in bullet fairing at base of rudder.

POWER PLANT: J-8B: Two LMC (Liyang) WP13A II turbojets, each rated at 42.7 kN (9,590 lb st) dry and 65.9 kN (14,815 lb st) with afterburning, mounted side by side in rear fuselage with pen-nib fairing above and between exhaust nozzles. Lateral, non-swept air intakes, with automatically regulated ramp angle and large splitter plates similar in shape to those of MiG-23. Internal fuel capacity (four integral wing tanks plus fuselage tanks) approximately 5,400 litres (1,426 US gallons; 1,188 Imp gallons). Single-point pressure refuelling. Provision for auxiliary fuel tanks on fuselage centreline and each outboard underwing pylon. J-8D retrofitted with probe for in-flight refuelling from Xian H-6 (Tu-16) bombers converted as aerial tankers.

F-8 IIM: Two LMC (Liyang) WP13B turbojets, each rated at 47.1 kN (10,582 lb st) dry and 68.7 kN (15,432 lb st) with afterburning.

ACCOMMODATION: Pilot only, on zero/zero ejection seat under one-piece canopy hinged at rear and opening upward. Cockpit pressurised, heated and air conditioned. Heated windscreen.

semi-active radar-guided AAMs, plus a new KJ-8602 RWR antenna on the fin tip. New avionics, some possibly of Israeli design or origin, include an HK-13E HUD, Type 563B INS, JD-3 II Tacan and an RKL-800A integrated ECM suite. In service with PLA Air Force and Navy.

Detailed description applies to J-8B except where indicated.

J-8 II ACT: Active Control Technology (fly-by-wire) testbed. First flew 29 December 1996; completed 49th and last sortie 21 September 1999; shown in model form at Airshow China, November 2000. Full-authority quad-redundant, three-axis digital AFCS; small canards mounted high on air intakes to induce instability; two 1553B-standard flight computers with databus interface; integrated servo actuators for all moving control surfaces.

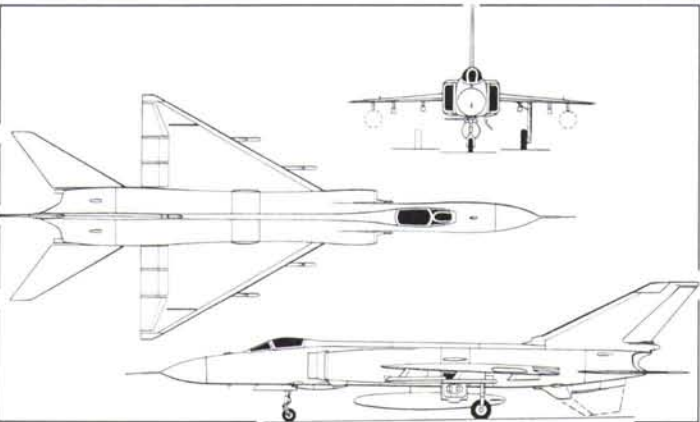
J-8C: New variant (originally J-8 IIM), development of which apparently began around 1990, but existence not noted until 2001. First prototype (c/n 8301, serial 510) reportedly flew 1992 but powered by WP13B engines instead of intended WP14 Kunlun. Elta EL/M-2034 fire control radar initially. Chinese Type 1471 later; integrated with new (Type 1785A ?) stores management system; IR-guided PL-8 or radar-guided PL-11 AAMs. Airframe changes included in-flight refuelling probe and additional fence on each wing. Reported digital fly by wire flight controls and redesigned cockpit with HUD and two MFDs. At least one other prototype completed (serial 511) but, although certified circa 1995, development delays with WP14 turbojet caused production plans to be abandoned. However, some upgrade technology graduated into later J-8F and J-8H variants.

J-8D ('Finback-B Mod'): Designation (originally J-8 IV) of J-8Bs built or modified for in-flight refuelling; non-retractable (but removable) probe on starboard side of cockpit; combat radius increased to 648 n miles (1,200 km; 745 miles). Avionics upgrades include Type 208B fire control radar, Type 563B INS, JD-3 II Tacan, KJ-8602 radar warning receiver, RKL-800A ECM and HK-13E HUD; PL-8 AAMs. In service with PLA Air Force and Navy from 1996.

J-8F: Developed from 1999; first flight 2000. Continues development started with J-8C, retaining detachable refuelling probe and additional wing fences; powered by uprated (approx 68.7 kN; 15,432 lb st) WP13B II turbojets and equipped to launch PL-12 (SD-10) AAMs, using improved Type 1493 fire control radar. Cockpit avionics may also have been further upgraded. Possibly now in limited AFPLA service with 3rd Regiment of 1st Division.

J-8H: Further development of J-8D (preceding J-8F). Programme reportedly began 1995 and variant approved 1999. Retains twin pairs of wing fences and removable refuelling probe; WP13B engines; KLJ-1 (Type 1492) radar; PL-11 AAMs; possibly also YJ-91 anti-radiation ASMs. Flying controls and avionics include HOTAS, INS/GPS and integrated ECM. Limited AFPLA service from 2002 including 21st Division; may be earmarked for upgrade to J-8F standard.

JZ-8: Reconnaissance version (also reported as J-8E and J-8 V), believed to be converted from J-8A; at least six known. Retains gun armament; undernose sensor package similar to that fitted to some Su-17/20/22 variants; centreline pod similar in appearance to that carried by MiG-21R, incorporating large rectangular camera window or SLAR antenna. In service with PLA Air Force. Note that a JZ-8 conversion of the original J-8 I also exists.



J-8B version of the 'Finback' twin-jet fighter (Dennis Punnett) 0507133

SYSTEMS: Two simple air-cycle environmental control systems, one for cockpit heating and air conditioning and one for radar cooling; cooling air bled from engine compressor. Two 207 bar (3,000 lb/sq in) independent hydraulic systems (main utility system plus one for flight control surfaces boost), powered by engine-driven pumps. Primary electrical power (28.5 V DC) from two 12 kVA engine-driven starter/generators (15 kVA in F-8 IIM), with two 6 kVA alternators for 115/200 V three-phase AC at 400 Hz. Pneumatic bottles for emergency landing gear extension. Pop-out ram air emergency turbine under fuselage.

AVIONICS (J-8B): Comms: VHF/UHF and HF/SSB radios; 'Odd Rods'-type IFF.

Radar: Obsolete Type 208 monopulse radar in nose. To be retrofitted with Phazotron Zhuk-8 II multimode fire-control radar (100 ordered in June 2001).

Flight: ILS, Tacan, marker beacon receiver, radio compass, radar altimeter, autopilot. Mission: Gyro gunsight and gun camera.

Self-Defence: RWR (antenna in fin tip); chaff/flare dispensers in tail cone. Enlarged avionics bays in nose and fuselage provide room for modernised fire-control system and other upgraded avionics of later versions.

AVIONICS (F-8 IIM): Comms: Advanced com/nav radios; IFF.

Radar: Phazotron Zhuk-8 II multifunction, look-up/look-down pulse Doppler radar, with 38 n mile (70 km; 43.5 mile) detection range for approaching targets and 21.5 n mile (40 km; 25 mile) range for receding targets (both targets assumed to have 3 m²; 32.3 sq ft radar cross-section). N010 Zhuk-27 being flight tested by late 1998, presumably in second aircraft.

Flight: Include Tacan and datalink; locally developed HUD and INS/GPS navigation; MFDs; HOTAS controls; ARINC 429 databus.

Self-defence: Omnidirectional RWR; rear hemisphere noise jammer against threat (including pulse Doppler) radars; chaff/flare dispenser.

ARMAMENT (J-8B): One 23 mm Type 23-3 twin-barrel cannon, with 200 rounds, in underfuselage pack immediately aft of nosewheel doors. Seven external stations (one under fuselage and three under each wing) for a variety of stores which can include PL-2B IR air-to-air missiles, PL-7 medium-range semi-active radar homing air-to-air missiles, Qingan HF-16B 12-round pods of 57 mm Type 57-2 unguided air-to-air rockets, launchers for 90 mm air-to-surface rockets, bombs, or (centreline and outboard underwing stations only) auxiliary fuel tanks.

ARMAMENT (F-8 IIM): Internal cannon as for J-8II. Up to six Chinese PL-5 or PL-9 short-range AAMs on underwing stations, or two Russian R-27R1 (AA-10 'Alamo') medium-range AAMs; up to four seven-round pods of 90 mm Type 90-1 rockets; up to 10 anti-runway bombs or 10 Type 250-III or 250-IV low-drag bombs (four under wings and six under fuselage); or eight anti-tank bombs; or five 500 kg low-drag bombs.

DIMENSIONS, EXTERNAL:

Wing span	9.345 m (30 ft 8 in)
Wing aspect ratio	2.1
Length overall: excl nose probe	20.53 m (67 ft 4¼ in)
incl nose probe	21.39 m (70 ft 2¼ in)
Height overall	5.41 m (17 ft 9 in)
Wheel track	3.74 m (12 ft 3¼ in)
Wheelbase	7.335 m (24 ft 0¾ in)

AREAS: Wings, gross 42.20 m² (454.2 sq ft)

WEIGHTS AND LOADINGS:

Weight empty: J-8B	9,820 kg (21,649 lb)
F-8 IIM	10,371 kg (22,864 lb)
Normal fuel load	4,200 kg (9,259 lb)

Max external stores load	4,500 kg (9,921 lb)
Normal T-O weight: J-8B	14,300 kg (31,526 lb)
F-8 IIM	15,288 kg (33,704 lb)
Max T-O weight: both	18,879 kg (41,621 lb)
Max wing loading: both	447.4 kg/m ² (91.63 lb/sq ft)
Max power loading: J-8B	143 kg/kN (1.40 lb/lb st)
F-8 IIM	138 kg/kN (1.35 lb/lb st)

PERFORMANCE (J-8B):

Max operating Mach No. (MMO)	2.2
Design max level speed	701 kt (1,300 km/h; 808 mph) IAS
Unstick speed	175 kt (325 km/h; 202 mph)
Touchdown speed	156 kt (290 km/h; 180 mph)
Max rate of climb at S/L	12,000 m (39,370 ft)/min
Acceleration from M0.6 to M1.25 at 5,000 m (16,400 ft)	54 s
Service ceiling	18,000 m (59,050 ft)
T-O run with afterburning	670 m (2,200 ft)
Landing run, brake-chute deployed	1,000 m (3,280 ft)
Combat radius	432 n miles (800 km; 497 miles)
Ferry range	1,025 n miles (1,900 km; 1,180 miles)
g limit in sustained turn at 5,000 m (16,400 ft)	+4.83

PERFORMANCE (F-8 IIM): As J-8B except:

Unstick speed	179 kt (330 km/h; 206 mph)
Touchdown speed	162 kt (300 km/h; 186 mph)
Level acceleration:	
M0.7 to M1.0 at 1,000 m (3,280 ft)	21 s
M0.6 to M1.25 at 5,000 m (16,400 ft)	55 s
Max rate of climb at M0.9:	
at 1,000 m (3,280 ft)	13,440 m (44,094 ft)/min
at 5,000 m (16,400 ft)	9,600 m (31,496 ft)/min
T-O run with afterburning	630 m (2,070 ft)
Landing run with brake-chute	900 m (2,955 ft)
Typical mission radius:	

air-to-air interception, out and back at M0.8:	
at 500 m (1,640 ft) with 3 min combat	189 n miles (350 km; 217 miles)
at 11,000 m (36,080 ft) with 5 min combat	540 n miles (1,000 km; 621 miles)
combat air patrol, incl 10 min patrol and 5 min combat, out at M0.8 at 5,000 m (16,400 ft), back at M0.8 at 11,000 m (36,080 ft)	324 n miles (600 km; 372 miles)
air-to-ground attack, out and back at M0.8 at 10,000 m (32,800 ft), incl 5 min combat	486 n miles (900 km; 559 miles)

g limits during sustained turn at M0.9:

at 1,000 m (3,280 ft)	+6.9
at 5,000 m (16,400 ft)	+4.7

SAC (SUKHOI Su-27SK) J-11

TYPE: Air superiority fighter.

PROGRAMME: In February 1996, the Russian military sales organisation Rosvooruzheniye (now Rosoboronexport) announced a contract under which China would be licensed to manufacture the Sukhoi Su-27 'Flanker' (up to 50 per year; total of 200 in all) at Shenyang.

An initial batch of 26 Russian-built Su-27s, delivered from 1992, comprised 24 Su-27SKs ('Flanker-B') and two two-seat Su-27UBK combat trainers ('Flanker-C'). These equipped the AFPLA's 3rd Division, based at Wuhu, Anhui Province, in the Nanjing Military Region. They were followed in 1996 by a further 24 (14 and 10, respectively), mostly delivered to the 2nd Division in Shuixi, Guangdong Province, Guangzhou Military Region. In February 1997 Russian licence granted for Chinese manufacture at Shenyang, initially in the form of CKD kit assembly; in 1998 KnaAPO delivered the first two kits; both aircraft made their first flight in December 1998. However, it was reported in mid-2000 that substantial work had caused Russian technicians to rebuild first two aircraft, necessitating import, from 14 December 2000 onwards, of 28 additional Russian-built two-seat Su-27UBKs to offset shortfall in Chinese production and maintain pilot training schedule. Eight of these delivered by 31 December 2000, with 10 each following in 2001 and 2002. Additional units now include 1st, 2nd, 6th, 7th, 19th, 29th and 33rd Divisions.

As regards Chinese production, six or seven Su-27s were planned to be assembled annually during 1999-2001, increasing to 15 to 20 per year from 2002. Chinese-built Su-27s are designated J-11 (single-seat) and JJ-11 (two-seat), but none of the latter had been reported by early 2006. By late 2004 all 105 parts kits (of diminishing completeness) representing the first batch had been delivered from Russia, of which 60 had been assembled and delivered to AFPLA, but there was no sign of the follow-on order for 95, nor of a change of local manufacture to Su-30MKK variant, as once expected. Acquisition of MKK (for which local designation J-13 suggested) is now from Russian production. PLA Naval Aviation also received 24 Su-30MK2s in 2004, bringing total 'Flanker' family acquisition to 273.



SAC J-11s of AFPLA's 6th Regiment/2nd Division at Suixi

1128924



55th Regiment/19th Air Division SAC J-11s

1128925

According to a late 2002 report Shenyang is developing its own multirole version of the J-11, to incorporate an indigenous multimode radar and other avionics and be capable of deploying the domestic PL-12/SD-10 active radar-homing AAM and Chinese or Russian PGMs. One Su-27SK/J-11 was also said to have been used in 2002 to flight test the domestic Liming WS10A turbofan engine. However, little progress in this direction had apparently been made by early 2006.

Completion of first J-11 batch assembly was anticipated by the end of 2006. Meanwhile, China said to be considering offer for second batch to be of upgraded Su-27SMK variant. According to Jane's sources in late 2004, 'several 10s' of J-11s had been refitted under a Russian (Technocomplex group) led programme involving changes to their NIIP N-001 radar to enable them to fire the Vympel RVV-AE (AA-12 'Adder') AAM.

CHINESE J-11 OPERATORS

Service	Air Division	Air Regiment	Base
PLA AF	1st	1st	Anshan
	2nd	6th	Suixi
	6th	n/k	Yinchuan
	7th	n/k	Zhangjiakou
	14th	40th	Nanchang
	19th	55th	Jining

SAIC (SHANGHAI)

SHANGHAI AVIATION INDUSTRIES GROUP
(SHANGHAI HANGKONG GONGYE GONGSI)
(SUBSIDIARY OF AVIC II)

2668 Zhongshan North Road, Shanghai 200063

Tel: (+86 21) 62 57 33 51

Fax: (+86 21) 62 57 33 50

e-mail: saiccn@saic-china.com

Web: www.saic-china.com

CHAIRMAN: Shen Huancheng

The Shanghai Aviation Industries Group (SAIC) has more than 20 subordinate enterprises, of which the principal ones are Shanghai Aircraft Manufacturing Factory (SAMF); Shanghai Aircraft Research Institute (SARI); Shanghai Aero-Engine Manufacturing Factory; and Shanghai International Aero Technology. SAIC and SARI are taking part in the development programme for the ACAC ARJ21 regional jet. Subcontract work includes components for the ATR 72 and Boeing 737.

SAIC (SHIJIAZHUANG)

SHIJIAZHUANG AIRCRAFT INDUSTRY CORPORATION
(SHIJIAZHUANG FEIJI GONGYE GONGSI)
(SUBSIDIARY OF AVIC II)

PO Box 164, 19 Beierhuan West Road, Shijiazhuang, Hebei 050062

Tel: (+86 311) 775 42 51

Fax: (+86 311) 775 29 93

e-mail: samc@samc.com.cn

Web: www.samc.com.cn

GENERAL MANAGER: Cheng Bingyou

CHIEF ENGINEER: Zheng Shuwei

SAIC (formerly SAMC) has produced Chinese Y-5 versions of the An-2 general purpose biplane since its establishment in 1970. In 1989 it developed the Y-5B series to meet the demands of various domestic civil and military customers and markets; other products have included the LE-500 light multipurpose aircraft and LE-800 business aircraft, apparently inspired by the Socata TB 20 Trinidad and TBM 700 respectively; and W-5A-200 ultralight series. SAIC is the only major company now regularly building general aviation light aircraft in China. It became part of Xian Aircraft Industrial Group July 1992, but relocated within AVIC II in 1999 reorganisation.

Occupies 54 ha (133.4 acre) site, including over 100,000 m² (1,076,400 sq ft) of covered space. Workforce of 2,309 in December 2003 included 430 engineers and technicians.

SAIC Y-5

Chinese name: Yunshuji-5 (Transport aircraft 5)

TYPE: Utility biplane.

PROGRAMME: Antonov An-2 has been built under licence in China since 1957, chiefly at Nanchang (727 produced up to 1968) and latterly by SAIC (now only source of continuing production of this aircraft). Production of original Y-5 civil transport and general purpose



SAIC Y-5B in civilian use (Robert Hewson)

1044664

version ended in 1986, at which time 221 had been completed. Y-5B dedicated agricultural and forestry version made first flight 2 June 1989; first nine produced in 1990; batch production continuing in 2004 (latest information received).

CURRENT VERSIONS: **Y-5B**: Dedicated agricultural and forestry version; certified to CCAR 23 Chinese equivalent of FAR Pt 23. A major annual task is locust plague pest control.

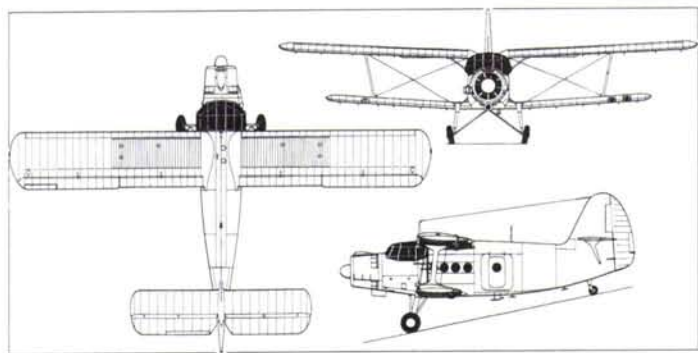
Following description applies to Y-5B, except where indicated.

Y5B-100: Designation of version displayed at Zhuhai in November 1998, fitted with wing 'tipsails' of the Y-5C and registered B-8448. Feature available as option.

Y-5B(K): Tourist version, first flown 1993; certified to CCAR 23.

Y-5B(D): Multipurpose (agri-forest or tourist) version, first flown 1995; certified to CCAR 23.

Y-5B(T): Parachutist version, with wingtip vanes ('tipsails'); first flown 1996 and 48 built for PLA Air Force (AFPLA).



SAIC Y-5 (Antonov An-2) transport biplane (Paul Jackson) 1047720

CUSTOMERS: Total of 142 Y-5Bs built by end of 2003.

DESIGN FEATURES: Unequal span, single-bay biplane; strut-braced wings (single I strut each side) and tail; fuselage circular section forward, rectangular in cabin section, oval in tail section; fin integral with rear fuselage. RPS wing section, thickness/chord ratio 14 per cent (constant).

FLYING CONTROLS: Conventional and manual. Differential ailerons, plus elevators and rudder, actuated by cables and push/pull rods; electric trim tab in port aileron, rudder and port elevator; full-span automatic leading-edge slots on upper wings; electrically actuated slotted trailing-edge flaps on both wings. Wingtip vanes on some variants (see Current Versions) for additional control at low speeds.

STRUCTURE: All-metal, with fabric covering on wings and tailplane. Y-5B specially treated to resist corrosion; cabin doors sealed against chemical ingress; empty weight reduced compared with original Y-5.

LANDING GEAR: Non-retractable split axle type, with long-stroke oleo-pneumatic shock-absorbers. Mainwheel tyres size 800x260, pressure 2.25 bar (33 lb/sq in). Pneumatic shoe brakes on main units. Fully castoring and self-centring tailwheel, size 470x210. Interchangeable ski landing gear optional.

POWER PLANT: One 735 kW (985 hp) Polish-built ASz-62IR-16 nine-cylinder radial engine, driving a Baoding J12B-G15 four-blade variable-pitch propeller. Fuel capacity 1,240 litres (328 US gallons; 273 Imp gallons). Oil capacity 115 litres (30.4 US gallons; 25.3 Imp gallons).

ACCOMMODATION: Flight crew of one or two; dual controls; seats for 12 tourist class passengers (Y-5B(K)) or 10 parachutists (Y-5B(T)). Emergency exit on starboard side at rear. Cabin heating and ventilation improved by new ECS.

AVIONICS: Comms: Honeywell KHF 950 HF and KY 196 VHF radios, KMA 24 MBR/audio control panel and KR 87 ADF; some electrical and other instrument installations also improved.

Flight: GPS 155.

EQUIPMENT: Large hopper/tank with emergency jettison of contents; high flow rate, wind-driven pump; sprayers with various nozzle sizes, depending upon spray volume required.

DIMENSIONS, EXTERNAL:

Wing span: upper	18.18 m (59 ft 7 3/4 in)
lower	14.24 m (46 ft 8 1/2 in)
Wing aspect ratio: upper	7.6
lower	7.3
Length overall, parked	12.69 m (41 ft 7 1/2 in)
Height overall, parked	6.10 m (20 ft 0 1/4 in)
Wheel track	3.36 m (11 ft 0 1/4 in)
Wheelbase	8.06 m (26 ft 5 1/4 in)
Propeller diameter	3.60 m (11 ft 9 3/4 in)
Cargo door (port): Mean height	1.55 m (5 ft 1 in)
Mean width	1.39 m (4 ft 6 3/4 in)

DIMENSIONS, INTERNAL:

Cargo compartment: Length	4.10 m (13 ft 5 1/2 in)
Max width	1.60 m (5 ft 3 in)
Max height	1.80 m (5 ft 10 3/4 in)

AREAS:

Wings, gross: upper	43.54 m ² (468.7 sq ft)
lower	27.98 m ² (301.2 sq ft)

WEIGHTS AND LOADINGS (A: Y-5B with dry chemical spreader, B: Y-5B with liquid spray system, C: Y-5B(T)):

Max payload: A, B, C	1,500 kg (3,307 lb)
Max T-O weight: A, B, C	5,250 kg (11,574 lb)
Max wing loading: A, B, C	73.4 kg/m ² (15.03 lb/sq ft)
Max power loading: A, B, C	7.15 kg/kW (11.75 lb/hp)

PERFORMANCE (A, B and C as for Weights):

Max level speed at S/L:

A	110 kt (205 km/h; 127 mph)
B	108 kt (200 km/h; 124 mph)
C	129 kt (239 km/h; 148 mph)

Max level speed at FL56:

A	119 kt (220 km/h; 137 mph)
B	116 kt (215 km/h; 133 mph)
C	138 kt (256 km/h; 159 mph)

Operating speed: A, B 86 kt (160 km/h; 99 mph)

Stalling speed: A, B, C 46 kt (85 km/h; 53 mph)

Max rate of climb at S/L: A 120 m (394 ft)/min

B	114 m (374 ft)/min
C	213 m (699 ft)/min

Rate of climb at FL52:

A	133 m (436 ft)/min
B	123 m (404 ft)/min
C	225 m (738 ft)/min

Service ceiling: A, B 4,500 m (14,760 ft)

C	5,000 m (16,400 ft)
---	---------------------

Air turning radius: A, B, C 350 m (1,150 ft)

T-O run: A 170 m (560 ft)

B	180 m (595 ft)
C	150 m (495 ft)

Landing run: A 160 m (525 ft)

B	157 m (515 ft)
C	170 m (560 ft)

Max range with 670 litres (177 US gallons; 147 Imp gallons) fuel:

A, B	581 n miles (1,077 km; 669 miles)
C	874 n miles (1,620 km; 1,006 miles)

Max endurance, conditions as above: A, B 7 h 12 min

C	10 h 10 min
---	-------------

Agri-forest operating swath width (A, B): HV, LV 40–50 m (130–165 ft)

ULV 60 m (200 ft)

SAIC LE-500 LITTLE EAGLE

Western marketing name: Kitty Hawk

TYPE: Four/five-seat lightplane.

PROGRAMME: Begun in 2000. Mockup displayed at November 2002 Airshow China in Zhuhai; prototype (B-649L) rolled out and made first flight 26 October 2003. Completion of flight testing (339 flights) announced 21 April 2005; CCAR Type Certificate awarded October 2005. In production by early 2007.

CUSTOMERS: As of March 2006, firm orders reported (each for 15 aircraft) from Civil Aviation Flight University of China (CAFUC) and Qingdas Jiutian Spartan Flight Academy. First 10 for CAFUC due to be delivered by end of June 2006. Letters of intent said to have been received from other Chinese flying schools and general aviation companies for more than 150.

DESIGN FEATURES: Joint development by SAIC, Xian Aircraft Development and Research Institute (XADRI) and CAFUC; conforms to CCAR 23-R2 standards. Design life 10,000 hours or 20,000 take-offs and landings. Designed primarily for training, but adaptable for such roles as business transport, courier, agricultural and forest work, environmental patrol, aerial survey and photography, club flying, police and military operations.

Dihedral 6° 30'; incidence 3°.

FLYING CONTROLS: Conventional and manual. All-moving slab tailplane.

STRUCTURE: All-metal semi-monocoque.

LANDING GEAR: Tricycle type; retractable.

POWER PLANT: One 194 kW (260 hp) Textron Lycoming IO-540-V4A5 flat-six engine, driving a Hartzell HC-C2YK-1BF/F8477-4-80 two-blade, constant-speed, non-feathering propeller.

ACCOMMODATION: Side-by-side seats, in two rows, for pilot and three (optionally four) passengers.

AVIONICS: To customer's choice.

DIMENSIONS, EXTERNAL:

Wing span	9.88 m (32 ft 5 in)
Length overall	7.745 m (25 ft 5 in)
Height overall	3.045 m (10 ft 0 in)
Wheel track	2.20 m (7 ft 2 1/2 in)
Wheelbase	1.905 m (6 ft 3 in)
Propeller diameter	2.03 m (6 ft 8 in)

WEIGHTS AND LOADINGS:

Max fuel weight	235 kg (518 lb)
Useful load	560 kg (1,235 lb)
Max T-O weight	1,400 kg (3,086 lb)
Max power loading	7.23 kg/kW (11.87 lb/hp)



SAIC LE-500 Little Eagle four/five-seat light aircraft (Robert Hewson) 1040451

PERFORMANCE:

Max level speed	151 kt (280 km/h; 174 mph)
Max cruising speed	135 kt (250 km/h; 155 mph)
Max rate of climb at S/L	345 m (1,132 ft)/min
Service ceiling	4,200 m (13,780 ft)
T-O run	383 m (1,260 ft)
Landing run	270 m (885 ft)
Range with max fuel	966 n miles (1,790 km; 1,112 miles)
Max endurance	8 h

SAIC LE-800

TYPE: Business turboprop.

PROGRAMME: Joint development by SAIC and No. 1 Aircraft Institute; revealed in model form at Airshow China, Zhuhai, November 2004.]

POWER PLANT: One Pratt & Whitney Canada PT6A turboprop, driving a four-blade propeller.

ACCOMMODATION: Seats for eight to 10 persons including pilot(s).

DIMENSIONS, EXTERNAL:

Wing span	14.70 m (48 ft 2 3/4 in)
Length overall	11.00 m (36 ft 1 in)

WEIGHTS AND LOADINGS:

Weight empty	2,000 kg (4,409 lb)
--------------------	---------------------



Model of Shijiazhuang LE-800, revealed at Zhuhai in November 2004

(Robert Hewson)

1044630

Fuel weight	800 kg (1,764 lb)
Max T-O weight	3,500 kg (7,716 lb)
PERFORMANCE (estimated):	
Cruising speed	221 kt (410 km/h; 255 mph)
Range at cruising speed above	863 n miles (1,600 km; 994 miles)

SAMF

SHANGHAI AIRCRAFT MANUFACTURING FACTORY
(SHANGHAI FEIJI ZHIZAO GONGCHANG)
(SUBSIDIARY OF SAIC SHANGHAI)

3115 Chang Zhong Road, Shanghai 200436

Tel: (+86 21) 56 68 11 22

Fax: (+86 21) 56 68 43 36

e-mail: b.d@samf.cn

Web: www.samf.cn

PRESIDENT: Wang Wenbin

Shanghai Aircraft Manufacturing Factory (SAMF) created 1950; now part of Shanghai Aviation Industries Group (SAIC, which see); occupies site area of 135.5 ha (334.8 acres). Developed Y-10, China's first indigenous jet airliner. Built small batch of McDonnell Douglas MD-82/83 airliners in mid-1990s, and produced main and landing gear doors for MD-80 series from 1979; produced cargo and service doors, avionics access doors and tailplanes for these aircraft. Current subcontract work includes tailplanes for Boeing 737 NG. Also built Q-2 ultralight.

SSAC

SHANGHAI SIKORSKY AIRCRAFT COMPANY
(SHANGHAI SIKORSKY FEIJI GONGSI)

HEAD OFFICE: 3115 Chang Zhong Road, Shanghai 200436

Tel: (+86 21) 66 50 74 76 and 56 68 08 99

Fax: (+86 21) 66 50 74 67

e-mail (1): public@shanghaisikorsky.com

e-mail (2): caiyan@shanghaisikorsky.com

Web: www.shanghaisikorsky.com

WORKS: 1 Huadong Road, Shanhuang Village, Gaodong Town, Pudong New District, Shanghai 200137

Tel: (+86 21) 58 48 57 29

Fax: (+86 21) 58 48 57 47

e-mail: caiyan@shanghaisikorsky.com

CEO: Teng Wei

GENERAL MANAGER: Chris Jaran

SALES MANAGER: Cai Yan

Agreement to form this private joint venture company announced in February 2002 by Sikorsky Aircraft of USA and Shanghai Little Eagle Science and Technology Company (SLEC). Objective is Chinese kit assembly and/or local manufacture of Schweizer 300C, 300CB and 333 (which see), with certification and marketing assistance from Sikorsky; shareholding SLEC 51 per cent, Sikorsky 49 per cent. Government business licence awarded April 2003. Exclusive sales rights for Cambodia, China, Hong Kong, Laos, Macau and

Vietnam. Reported capacity to produce up to 24 aircraft per year from 2004. New 3,000 m² (32,292 sq ft) assembly plant opened in late 2004.

SSAC (SCHWEIZER) SHEN SERIES

PROGRAMME: First three (of five) kits delivered 26 August 2002; assembly in China by Schweizer personnel under way by November 2002. Target of 24 for completion in first full year of programme (not achieved); plan to reach eventual peak of 48 per year. Chinese government approval to begin business operations received April 2003. Name 'Shen' derived from Shanghai's river.

CURRENT VERSIONS: **Shen2B**: Schweizer 300CBi (two seats, 134 kW; (180 hp) Lycoming HO-360-G1A engine); optimised for training and police patrol.

Shen3A: Schweizer 300C (three seats, 142 kW; 190 hp Lycoming HIO-360-D1A engine); utility missions include agriculture and police or powerline patrol.

Shen4T: Schweizer 333 (four seats, 186 kW; 250 shp R-R 250-C20W turboshaft); law enforcement, observation, powerline patrol and turbine training. CAAC type certificate March 2005.

CUSTOMERS: First two Shen2Bs leased to Panyu Police by Guangdong Baiyun General Aviation Company 2002; two Shen2Bs and one Shen3A to Xinjin branch of China Civil Aviation Flying College in September 2002; one Shen3A to Sichuan Forestry Bureau in 2003; two Shen3A for April 2004 delivery to Pianjin Aviation University; one Shen4T for unnamed customer. No further sales or completions reported by mid-2006.

COSTS: Shen2B USD260,000, Shen3A USD280,000, Shen4T USD600,000 (approximate, 2003).

SVAM

SHANGHAI VANTAGE AIRSHIP MANUFACTURING COMPANY
(SHANGHAI VANTAGE FEITING ZHIZAO GONGSI)

1258 Shitai Road, Baoshan District, Shanghai 200942

Tel: (+86 21) 66 03 65 88

Fax: (+86 21) 66 03 67 88

e-mail: svam@sh163.net

Web: www.vantageship.com

PRESIDENT: Xu Shunli

Company formed 1991 and registered in May 2000 with capital of CNY10 million; workforce of 28 are mainly former military personnel, many (including three qualified airship pilots) with helium airship experience; has CAAC approval. Completed its first airship (single-place CA-50) in September 1999; second was medium-sized, twin-engined CA-80 for advertising, aerial photography and surveillance; combined flying hours more than 220 by late 2002. CA-120M (004) exported to Japan July 2002; prototype CA-160M completed July 2004 and was scheduled to fly during 2005. Engineering design and envelope manufacture for new model CA-120 completed in 2005. Long-term plans include 60 tonne payload CA-800.

SVAM CA-80 VANTAGESHIP

TYPE: Helium non-rigid airship.

PROGRAMME: Completed September 2001. In service as advertising and aerial survey or surveillance platform. Certified to equivalent of FAA airworthiness standard. A CA-80B has also been reported, built in 2002.



The twin-engined SVAM CA-80 helium semi-rigid

1042714

CUSTOMERS: Two built (001 and 002) for Dalian General Aviation Company; commercial operation due to begin June 2006.

DESIGN FEATURES: Conventional envelope shape with ventral gondola. Four tailfins, with rudders/elevators, in cruciform configuration. Internal illumination of full-colour graphics on translucent envelope; or easily interchangeable full-colour banner.

FLYING CONTROLS: Electro-mechanical. Front and rear ballonets for trim control (25 per cent of volume).

STRUCTURE: Envelope of US-developed material (lamination of woven fabric and plastics film), white and translucent; butt-welded, splice-welded and splice-bonded; all seams tape-sealed externally. Batten-reinforced nosecone.

POWER PLANT: Twin, Teledyne Continental IO-240-B vectored-thrust piston engines, each 93 kW (125 hp), driving MT-Propeller MTV-7(D) variable-pitch, pusher propellers. Fuel capacity 405 litres (107 US gallons; 89.1 Imp gallons).

ACCOMMODATION: Pilot and one passenger at front; seats for three more passengers to rear.

AVIONICS: Comms: Bendix/King Silver Crown, including dual KX 96A VHF and KT 76A transponder.

Flight: Garmin 168C GPS.

DIMENSIONS, EXTERNAL:

Envelope: Length	42.00 m (137 ft 9½ in)
Max diameter	11.00 m (36 ft 1 in)
Fineness ratio	3.8
Height overall	14.40 m (47 ft 3 in)
Banner area (each side):	
Length	30.60 m (100 ft 4¾ in)
Depth	10.08 m (33 ft 0¾ in)
Gondola: Length	3.90 m (12 ft 9½ in)
Max width	1.60 m (5 ft 3 in)
Max height	1.85 m (6 ft 0¾ in)

DIMENSIONS, INTERNAL:

Envelope volume	2,533.0 m³ (89,450 cu ft)
Ballonet volume (25%)	633.25 m³ (22,363 cu ft)
Cabin length	approx 2.80 m (9 ft 2¼ in)

AREAS:

Advertising banner area (total)	616.9 m² (6,640.25 sq ft)
---------------------------------	---------------------------

WEIGHTS AND LOADINGS:

Weight empty	1,850 kg (4,079 lb)
Max fuel weight	300 kg (661 lb)
Max payload	692 kg (1,526 lb)
Max buoyancy	2,570 kg (5,666 lb)
Max T-O weight	2,542 kg (5,604 lb)

PERFORMANCE:

Max level speed	49 kt (91 km/h; 56 mph)
Max cruising speed	37 kt (69 km/h; 43 mph)
Max rate of climb at S/L	480 m (1,575 ft)/min
Max rate of descent	300 m (985 ft)/min
Pressure ceiling	2,745 m (9,000 ft)
Range	301 n miles (557 km; 346 miles)
Endurance	up to 10 h

SVAM CA-120 VANTAGESHIP

TYPE: Helium non-rigid airship.

PROGRAMME: One CA-120M (004) completed and exported to Japan July 2002. Envelope for a second CA-120 completed in 2005.

Description generally as for CA-80 except as follows:

DIMENSIONS, EXTERNAL:

Envelope: Length	48.00 m (157 ft 5¾ in)
Max diameter	11.80 m (38 ft 8½ in)
Fineness ratio	4.1
Height overall	15.20 m (49 ft 10½ in)
Banner area (each side):	
Length	36.00 m (188 ft 1¼ in)
Depth	9.27 m (30 ft 5 in)
Gondola: Length	5.90 m (19 ft 4¼ in)
Max width	1.60 m (5 ft 3 in)
Max height	1.75 m (5 ft 9 in)

DIMENSIONS, INTERNAL:

Envelope volume	3,406 m³ (120,282 cu ft)
Ballonet volume (25%)	851.5 m³ (30,070 cu ft)
Cabin length	approx 4.80 m (15 ft 9 in)

AREAS:

Advertising banner area (total)	667.4 m² (7,183.8 sq ft)
---------------------------------	--------------------------

WEIGHTS AND LOADINGS:

Weight empty	2,180 kg (4,806 lb)
Max fuel load	300 kg (661 lb)
Max payload	1,203 kg (2,652 lb)
Max buoyancy	3,456 kg (7,619 lb)
Max T-O weight	3,383 kg (7,458 lb)

PERFORMANCE:

Max level speed	46 kt (85 km/h; 53 mph)
Max cruising speed	35 kt (65 km/h; 40 mph)
Max rate of climb at S/L	480 m (1,575 ft)/min

WHIC

WUHAN HELICOPTER INDUSTRY COMPANY (WUHAN ZHISHENGJI GONGYE GONGSI)

14F Liangyou Building, 316 Zinhua Road, Wuhan 430022

Tel: (+86 27) 85 49 64 08

Fax: (+86 27) 85 49 63 78

e-mail: zsj@whzsj.com

Web: www.whzsj.com

PRESIDENT: Dinghe Zhang

Established August 1993, under auspices of Wuhan local government, and with CNY64.5 million capital, to co-produce Enstrom F28F, 280FX, TH-28 and 480 helicopters

(which see); assembled first two (280FX and TH-28) from CKD kits October 1993; delivered to Wuhan Public Security Bureau and PLA respectively; at least one more US-built TH-28 supplied to China in May 1997. Two Enstrom 480s delivered for reassembly in June 1998. WHIC also operates an Enstrom 480 as demonstrator and for charter work. New factory completed on a 150 ha (370.7 acre) site and reportedly became operational in 1998.

Agreement revived by March 2003, when Enstrom announced that component manufacture by WHIC expected to begin in third quarter of that year. Manufacture duly launched on 3 September 2003, coupled with news that plant had received CNY202 million investment from Wuhan Helicopter General Aviation Company (www.whgac.com). However, only four sales reported by end of 2003 and full production had apparently not begun by end of 2005, despite mid-2004 letter of intent by Wuhan municipal government for two 480Bs. Factory is expected to have eventual capability for completing up to 100 helicopters per year. Most are expected to be used for forest fire patrol work.

XAC

XIAN AIRCRAFT INDUSTRY COMPANY (XIAN FEIJI GONGYE GONGSI) (SUBSIDIARY OF AVIC I)

PO Box 140-84, Xian, Shaanxi 710089

Tel: (+86 29) 684 56 65

Fax: (+86 29) 620 37 07

e-mail: qhb@xac.com.cn

Web: www.xac.com.cn

CHAIRMAN AND PRESIDENT: Gao Dacheng

VICE-CHAIRMAN: Meng Xiangkai

VICE-PRESIDENT: Chen Fusheng

AIRCRAFT MARKETING MANAGER: Wang Zhigang

Aircraft factory established at Xian 1958; currently (2006) has 1.3 million m² (14 million sq ft) of factory accommodation on a 300 ha (741.5 acre) site and a workforce of more than 20,000. Aviation activities embrace 20 aircraft design departments and five aircraft design laboratories, and have produced more than 20 different types of aircraft. Non-aero subsidiaries of the Group include those devoted to electronic products (XAC Qinghua Electronics Company), automobiles and architectural materials. Group companies have ISO 9000 status.

Major current programmes concern JH-7 attack aircraft and MA60 transport (Y-7/An-24 derivative). Xian Aircraft Design and Research Institute (XADRI) is a participant in the ACAC ARJ21 regional jet programme.

Subcontract work includes glass fibre header tanks, water float pylons, ailerons and various doors for Bombardier 415 amphibian; fins and tailplanes for Boeing 737/747; wing trailing-edge ribs for Boeing 747 and floor beams for 747-400 Special Freighter; and A320 wing components and doors for Airbus; some 3,700 shipsets of various components had been delivered to Airbus and Boeing by the end of 2000. Since 1997, subcontracting for ATR (which began with ATR 42 wingtips in 1986) has been extended to include ATR 42 wing boxes and ATR 72 rear fuselage sections.

XAC H-6

Chinese name: Hongzhaji-6 (Bomber aircraft 6)

TYPE: Strategic bomber.

PROGRAMME: Reports from several Chinese sources imply that China's copy of the venerable Tu-16 'Badger' remains in production or, more precisely, was returned to production in the late 1990s as a launch platform for YJ-63 (KD-63) cruise missiles — one of which is carried beneath each wing — with the designation H-6H. The first H-6H is reported to have flown in December 1998 and made the first successful air launch of a YJ-63 in November 2002. Examples have also been seen with four underwing pylons, possibly for different weapons. H-6Hs carry search radar beneath the forward fuselage, but their distinguishing feature is a semi-globular radome scabbled to the lower rear fuselage. Defensive guns have been removed. Earlier, about 10 were converted as H-6J aerial refuelling tankers.



H-6 bomber production line at XAC

1037982

XAC JH-7

Chinese name: Jianji Hongzhaji-7 (Fighter-Bomber aircraft 7)

Westernised designation: FBC-1 (formerly B-7)

Export name: Flying Leopard

TYPE: Attack fighter.

PROGRAMME: Revealed publicly September 1988 as model at Farnborough International Air Show; first of at least four flying prototypes (081, 083, 084 and 085) said to have been rolled out during previous month; first flight 14 December 1988 and first supersonic flight 17 November 1989; service entry originally scheduled for 1992-93, but delayed; first seen openly in TV broadcast of October 1995 naval exercise.

First public appearance (by third prototype '083', wearing Flight Test Establishment colours) was made in November 1998 flypast at Airshow China in Zhuhai. This coincided with announcement of new export designation and name, and statement that aircraft was "being redesigned" for export market.

CURRENT VERSIONS: JH-7: Domestic version.

Following description applies to JH-7 except where indicated.

JH-7A: No. 603 Institute reportedly undertook improvements to JH-7 that include No. 613 Institute FLIR/laser targeting pod and No. 607 Institute Blue Sky low-altitude



XAC H-6 fitted with four underwing pylons and still in factory finish



XAC JH-7A of 28th Division, identified by single-piece windscreen and twin ventral fins, of which starboard unit is visible in this view

navigation pod; modified LETRI JL-10A Shen Ying J-band radar; digital (and possibly quadruple) fly-by-wire controls; a health monitoring system; INS/GPS; new databus; and integration of additional Russian weapons such as Kh-31P (AS-7 'Krypton') standoff missiles and KAB-500 laser-guided bombs.

Development completed in 2001 and first flight of aircraft '811' achieved 1 July 2002. External features include twin ventral fins; use of composites in wing and tailplane; removal of wing fences; two additional hardpoints each side; and one-piece windscreen. At least one other prototype ('8812'). Entered service in 2003. According to Jane's sources, a new (JH-7B) upgrade standard was in prospect in 2005.

FBC-1 Flying Leopard: Designation (from 1998) of proposed export version; would have customer-defined radar, avionics and armament. No orders yet announced.

FBC-1M Flying Leopard II: Upgraded export version, revealed in model form at Aviation Expo/China exhibition in Beijing, September 2003. Improvements generally parallel those described for JH-7A, plus possible further increase of external hardpoints to 11, enabling maximum stores load of up to 9,000 kg (19,842 lb).

CUSTOMERS: Earlier (1997) Chinese reports, of up to 24 in service with PLA Naval Air Force in operational evaluation role in mid-1997, were apparently exaggerated (stated at 1998 Airshow China that only seven prototype/preproduction aircraft then completed). By early 2001 20 aircraft, excluding prototypes, confirmed by code numbers (69 to 88); this is compatible with known number (50) of Spey engines initially purchased, but it has been reported that a further 80 to 90 surplus or second-hand Speys were delivered in mid-2001; these possibly for further JH-7s as well as JH-7A.

First identified JH-7 unit was PLA Naval Air Force 16th Bomber Regiment, 6th Naval Air Division, at Dachang, Shanghai. Aircraft of 1st Squadron numbered 81760 to '769; 2nd Squadron 81860 to '868; while 81669 also seen. By 2003, first of some 20 further JH-7s (at least codes 04 to 19) noted at Yiwu, with 17th Regiment; ranges appear to be 82061 to '069 and 82160 to '169. First JH-7As assigned to 9th Division, People's Navy, at Ledong, where 83096 and 83097 of 27th Regiment noted by 2004.

PLA Air Force had received initial aircraft by 2004, with 28th Air Division (formerly with Q-5s) equipping at Hangzhou with aircraft including 21092 and 21094, probably of 83rd Regiment.

DESIGN FEATURES: In same role and configuration class as Russian Sukhoi Su-24 'Fencer'. High-mounted wings with compound sweepback, dog-tooth leading-edges and 7° anhedral; twin turbofans, with lateral air intakes; all-swept tail surfaces, comprising large main fin, single small ventral fin and low-set all-moving tailplane with anti-flutter weights at tips; small overwing fence at approximately two-thirds span. Wings have 47° 30' sweepback on leading-edges. Quarter-chord sweep angles approximately 45° on fin, 55° on tailplane.

STRUCTURE: Conventional all-metal, except for dielectric panels. Plans to fit SF18 radar-absorbent material revealed in early 1999.

LANDING GEAR: Retractable tricycle type, with twin wheels on each unit. Trailing-link main units retract inward, nose unit rearward.

POWER PLANT: All aircraft so far built are powered by two licence-built (Xian WS9 Qingling) or UK-supplied Rolls-Royce Spey Mk 202 turbfans: each 91.2 kN; 20,515 lb st with afterburning). Centreline and outboard underwing stations plumbed for auxiliary fuel tanks.

Original intention to power production JH-7 with LM (Liming) W56 turbofans of 71.1 kN (15,990 lb st) dry rating (122.1 kN; 27,445 lb st with afterburning) abandoned, as was licensed production of Russian alternative such as Saturn/Lyulka AL-31F or SNECMA M53-P2.

ACCOMMODATION: Crew of two in tandem (rear seat elevated). HTY-4 ejection seats, operable at speeds from zero to 540 kt (1,000 km/h; 621 mph) and altitudes from S/L to 20,000 m (65,600 ft). Individual canopies, hinged at rear and opening upward. One-piece wraparound windscreens on JH-7A.

AVIONICS (FBC-1): *Comms*: Short wave and ultra short wave transceivers of Italian origin.

Radar: LETRI JL-10A Shen Ying J-band pulse Doppler fire-control radar (search range 43 n miles; 80 km; 50 miles and tracking range 22 n miles; 40 km; 25 miles in look-up mode, or 29 n miles; 54 km; 34 miles and 17 n miles; 32 km; 20 miles, respectively, in look-down mode). Scans $\pm 60^\circ$ in azimuth and can track four targets simultaneously.

Flight: Automatic flight control system; GPS/INS navigation.

Instrumentation: Includes No. 603 Institute HUD and two other MFDs.

Mission: AECs linked to fire-control system; No. 613 Institute helmet-mounted sight.

Self-defence: Chaff/flare dispenser at base of vertical tail; omnidirectional RWR; active and passive ECM.

ARMAMENT: Twin-barrel 23 mm gun, with 200 rounds, in starboard side of lower fuselage, just forward of mainwheel bay. JH-7 has fuselage centerline stores station, plus two under each wing and rail for PL-5B, PL-7 or similar close-range air-to-air missile at each wingtip; JH-7A has additional mid-point station under each wing, plus one on lower side of each engine intake trunk. Typical underwing load for maritime attack, two C-801K or C-802K sea-skimming anti-ship missiles (inboard) and two drop tanks (outboard); C-803 (YJ-83) test-launched in 2002. Other potential weapons may include C-701 TV-guided anti-ship missiles and 500 kg LGBs.

DIMENSIONS, EXTERNAL:

Wing span	12.705 m (41 ft 8¼ in)
Wing aspect ratio	3.1
Length overall: excl probe	21.025 m (68 ft 11¾ in)
incl probe	22.325 m (73 ft 3 in)
Fuselage length (excl probe)	19.105 m (62 ft 8¼ in)
Height overall	6.575 m (21 ft 6¾ in)



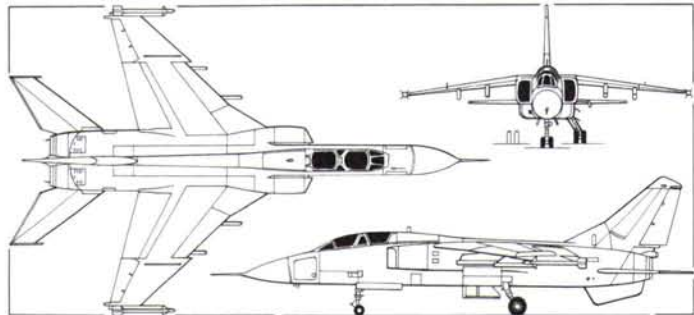
JH-7 of 17th Regiment, PLA Navy

1128927



MA60 (two P&WC PW127G turboprops)

1128929



XAC JH-7 interdictor (James Goulding)

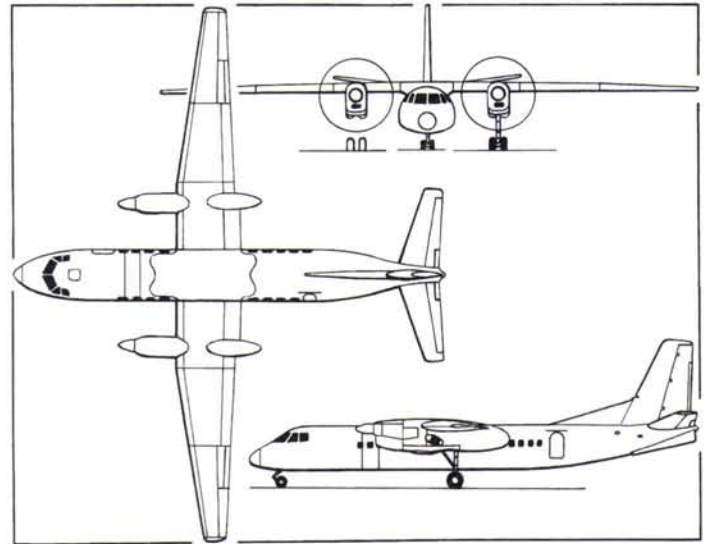
0105034

Tailplane span	7.39 m (24 ft 3 in)
Wheel track	3.06 m (10 ft 0½ in)
Wheelbase	7.805 m (25 ft 7¼ in)
AREAS:	
Wings, gross	52.30 m² (563.0 sq ft)
WEIGHTS AND LOADINGS:	
Max fuel weight	10,050 kg (22,156 lb)
Max external stores load	6,500 kg (14,330 lb)
Max T-O weight	28,475 kg (62,776 lb)
Max landing weight	21,130 kg (46,583 lb)
Max wing loading	544.5 kg/m² (111.51 lb/sq ft)
Max power loading (WS9 engines)	156 kg/kN (1.53 lb/lb st)
PERFORMANCE:	
Max level speed at 11,000 m (36,080 ft) (clean)	M1.7 (975 kt; 808 km/h; 1,122 mph)
Max operating speed	653 kt (1,210 km/h; 751 mph) IAS
Cruising speed	M0.80-0.85 (459–487 kt; 850–903 km/h; 528–561 mph)
Service ceiling (clean)	15,600 m (51,180 ft)
T-O run	920 m (3,020 ft)
Landing run	1,050 m (3,445 ft)
Combat radius	891 n miles (1,650 km; 1,025 miles)
Ferry range	1,970 n miles (3,650 km; 2,268 miles)
g limit	+7



MA60 in the livery of Air Zimbabwe

1128930



XAC MA60 twin-turboprop airliner (James Goulding)

1158974

Chinese name: Xinzhou-60
TYPE: Twin-turboprop airliner.

PROGRAMME: Model of MA60 as proposed Y7-200A (PW127 turboprop) variant first shown at Asian Aerospace, Singapore, February 2000. First flight (prototype B-995L) reportedly 12 March 2000; CAAC type certificate (to CCAR Pt 25) issued 22 June 2000; revenue service began August 2000; public debut (Airshow China) November 2000; production certificate issued 12 December 2000.

Designation indicates Modern Ark, 60 (high density) seats. To replace earlier Y-7 variants, which since 2001 have no longer met amended Chinese airworthiness requirements. XAC production capacity 12 to 15 a year; domestic operators lease from central leasing agency SFLC, which is responsible for sole-source marketing (first arrangement of this kind in China). According to a late 2004 report, the 11 reportedly delivered at that time had been grounded due to "reliability problems and two runway overruns".

CURRENT VERSIONS: **MA60:** Initial production passenger version; as described. Current life-cycle of 25,000 landings and 30,000 flight hours.



XAC MA60 twin-turboprop airliner

1128928

MA60-100: Improvements planned include reduction in empty weight by about 400 kg (882 lb); increase in 'hot-and-high' MTOW of about 900 kg (1,984 lb); increase in OEI ceiling; 162 n mile (300 km; 186 mile) increase in range; airframe drag reduction; Rockwell Collins Pro Line 21 avionics upgrade.

MA60-500: Updated MA60 equivalent of former Y7H, with rear-loading ramp/door inherited from An-26. Fully pressurised cargo compartment, with electric winch and hydraulic conveyor; cargo door can be retracted under belly to permit direct loading from truck or ground. Not known to have flown by early 2006, but programme then still active. Demonstrator bears CFTE serial number 073.

MA60M: Military transport version.

MA60-MPA (Fearless Albatross): Projected maritime patrol version (previously Y7-200BF); nose-mounted search radar; raked wingtips; auxiliary fuel tanks scabbled to fuselage sides to extend range to estimated 1,350 n miles (2,500 km; 1,553 miles); four underwing stations for air-to-air and anti-ship missiles. Shown as model at Airshow China, November 2000. Also seen in model form with dorsal 'balance beam' radar antenna similar to that on some Y-8 testbeds.

MA40: Shortened (40-passenger) version; under consideration.

CUSTOMERS: Sole-source domestic marketing by newly formed Shenzhen Finance Leasing Corporation which, on 7 November 2000, signed contract for delivery of 60 MA60s over five-year period. Launch operator Sichuan Airlines (five ordered, plus five on option) introduced first leased example (B-3426) into revenue service August 2000. Other reported domestic orders by March 2003 from Changan Airlines (two), China Northern (five), Wuhan Airlines (three) and Lao Aviation (three). Of these 18, six said to be in airline operation at that time. Order book reached 20 on 20 December 2004; China Eastern operating three by mid-2005. However, an April 2006 report claimed that only 11 of initial version completed, all of which withdrawn from service by that time. Most of first 60 expected to be of improved MA60-100 standard.

Export orders and commitments for 32 by November 2006, from Air Fiji (one), Air Zimbabwe (three), Congo Democratic Republic (three), Cuba (four), Lao Aviation (two), Merpati Nusantara (15), Royal Nepal Air Force (two VIP), and Zambian Air Force (two). Two delivered to Lao Aviation on 31 July and 20 September 2006 were 17th and 18th production aircraft.

COSTS: Approximately USD12.5 million (2006).

DESIGN FEATURES: Further upgrade of Y-7 series, mainly through Western engines and avionics and improved passenger comfort; incorporates best features of earlier Y7-200A and B programmes. Airframe life 40,000 hours, 25,000 cycles or 25 years. Operable from semi-prepared runways.

Non-swept high-mounted wings, with 2° 12' 12" anhedral on tapered outer panels; basically circular-section fuselage; sweptback fin and rudder; 9° dihedral on tailplane; twin ventral strakes under tailcone. Wing sweepback 6° 50' at quarter-chord of outer panels; incidence 3°.